FOOD MANUFACTURE

Incorporating Food Industries Weekly

LEONARD HILL LIMITED 17 STRATFORD PLACE LONDON W.1 MAY 1, 1943

LASTING BEAUTY

"Staybrite" Steel is not a mere coating; its stainlessness is inherent—solidly rustless through and through—and it virtually lasts for ever.

Any operation in the working of the other noble and decorative materials can be carried out equally well in "Staybrite" Steel, the most beautiful and practical metal for a whole range of domestic products.

"STAYBRITE"

REGD. TRADE MARK

SUPER RUSTLESS STEEL

● *Owing to the large demand, we are at present greatly restricted as regards the purposes for which this steel can be supplied*

FIRTH VICKERS STAINLESS STEELS, LTD., SHEFFIELD

Checkmate! (TO ALL YOUR LABEL AND CARTON PROBLEMS!)

"ALL you're used to having at the price you'd like to pay" is one way to describe what you get when you buy your labels "the LITHESK way." Consider these things:

The LITHESK way — two blues, one red and one yellow can together reproduce every degree of colour, every combination of tones, with perfect registration and colour-value.

The LITHESK way — precision presses, conditioned papers, tested inks and varnishes, combine to produce a standard of label QUALITY unheard of before LITHESK.

The LITHESK way — micro-accurate cutters give perfection to thousandths of an inch on every label, ensuring trouble-free labelling and packing on automatic machines.

The LITHESK "revolving stock" plan cuts out your label inventory almost entirely, gives you labels "fresh and crisp as your daily bread," gives you keener prices by far whether your need is for 25,000 or 25,000,000.

And even when you are satisfied on these points, there is something more. LITHESK labels will get your products *shown*. The crisp finish, the fine quality look of LITHESK will become a definite and ever-growing asset in building goodwill and creating sales for your products.

THE PRINTEX MACHINES. These are the machines that make the giant plates, wafer sheets of shimmering metal each carrying 20, 30 and sometimes 40 different labels. Their high technical accuracy, coupled with conditioned papers, is the basis of "LITHESK" quality—and "LITHESK" economy, too!

NOW IT'S YOUR TURN! *Whether you are a large or small user of labels and cartons, "The LITHESK Way" should be your way. Ask, without any obligation, for samples and constructive recommendations.*

BROWN & RAWCLIFFE LTD. *Lithographers* AINTREE, LIVERPOOL.
TELEPHONE: AINTREE 3441

THE "PHOENIX SIXTY"

ANALYTICAL FUNNEL

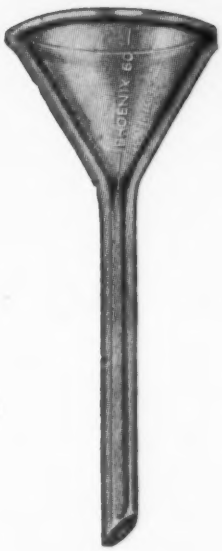
THE
FINEST
FUNNEL
FOR
FAST
FILTRATION

AVAILABLE

FROM

STOCK

AT LAST



Pressed in Metal Moulds
Heat-resisting Glass
Capillary Suction Stem
External Ribs
Smooth Top
Dead Smooth Interior

2 Sizes:
2" to take 7–11 cm. papers
3" to take 11–15 cm. papers

AVAILABLE FROM ALL LABORATORY SUPPLIERS
OR DIRECT FROM

TOWNSON & MERCER LTD.

390, SYDENHAM ROAD, CROYDON

Telephone:
Thornton Heath 3851 (5 Lines)

Telegrams:
Townson, Croydon

An Example of

— FOR — *"Service to Science"*

Index to ADVERTISERS

	PAGE
Agricultural and Chemical Products, Ltd.	lx
Aibro Fillers, Ltd.	April
Alfa-Laval Co., Ltd.	Mar.
Allen, Stafford, & Sons, Ltd.	xxv
Aluminium Plant and Vessel Co., Ltd.	April
Ashe Laboratories, Ltd.	Mar.
Automatic Weighing & Packing Co., Ltd.	lvii
Baldwins, Ltd.	xxxix
Barron, W. S., & Son, Ltd.	lx
Benjamin Electric, Ltd.	xxvii
Beth Label & Wrapper Machines, Ltd.	xxii
Blackwell Hayes & Co., Ltd.	iii
Blandola Co., The, Ltd.	Feb.
Boehm, Fredk., Ltd.	x, xlviii
Bolton's Superheater & Pipeworks, Ltd.	April
Brainos & Co.	I
Brandt, Richard	xlviii
Brehmer's, Aug. (British), Successor, Ltd.	xliv
Brierley, Wm., Collier & Hartley, Ltd.	xxviii
Bristol's Instrument Co., Ltd.	xli
British Arkady Co., Ltd.	iv
British Fermentation Products, Ltd.	lii
British Filters, Ltd.	vi
British Ratin Co., Ltd.	xliv
British Soya Products, Ltd.	vii
British Steam Specialties, Ltd.	iii
British Thomson-Houston Co., Ltd., The	xxxv
Broadbent, Thomas, Ltd.	xxxiii
Brooks, R., & Co.	lxii
Brown & Rawcliffe, Ltd.	Inside Front Cover
Brush Electrical Co., Ltd.	April
Bryan, W., Ltd.	iix
Buckinghamshire Paper Box Co. Ltd.	lviii
Burma Teak Shippers	April
Bush, W. J., & Co., Ltd.	April
Butterfield, W. P., Ltd.	April
Callow Bros., Ltd.	lxi
Cambridge Instrument Co., Ltd.	April
Cameron Can Machinery Co.	Mar.
Canning Town Glass Works, Ltd.	lvii
Chater, Joseph, & Sons, Ltd.	April
Cheverton & Laidler, Ltd.	xxxviii, lxi
Clark, R. I., Ltd.	xxiv
Clark, T. & C., & Co., Ltd.	xlvii
Cleland, Wm. Ltd.	liv
Cohen, Geo., Son & Co., Ltd.	lxi
Cocoa and Chocolate (War Time) Association	viii
Cochran & Co. (Annan), Ltd.	Mar.
Cole, E. K., Ltd.	Feb.
Crane, Ltd.	xiii
Crofts (Engineers), Ltd.	liv
Crompton Parkinson, Ltd.	xv
Cumming, Parsons, Ltd.	April
Danks (Netherton), Ltd.	lxii
Dawson Bros.	xxxviii
Dewey & Almy, Ltd.	Inside Back Cover
Distillers Co.	lvi
Drayton Regulator & Instrument Co., Ltd., The	Back Cover
Dubuis & Rowsell, Ltd.	I
Duché, T. M., & Sons (U.K.), Ltd.	iv
Dutton, Leonard, & Sons	liv
Edme, Ltd.	lviii
Elliott Bros. (London), Ltd.	lvi
Ellison Insulations, Ltd.	lviii
Ellison, Geo., Ltd.	v
Evans, Adlard & Co., Ltd.	iix
Evans, Wm., & Co. (Hereford & Devon), Ltd.	xlv
Evertaut, Ltd.	lvi
Firth-Vickers Stainless Steels, Ltd.	Front Cover
Ford Motor Co., Ltd.	xiii
Fraser, John, Ltd.	I
Fry's Metal Foundries, Ltd.	Mar.
Fuller, Horsey, Sons, & Cassell	lviii
Gardner, Wm., & Sons (Gloucester), Ltd.	xxvi
G. C. Engineering Co., Ltd.	I
General Electric Co., Ltd., The	ix, xii
Gerrard Industries, Ltd.	Mar.
Gledhill Brook Time Recorders, Ltd.	April
Gloy and Empire Adhesives, Ltd.	xlix
Gosheron, John, & Co., Ltd.	lxi
Griffith Hughes, E., Ltd.	Mar.
Hall, J. & E., Ltd.	Feb.
Hamburger, M., & Sons, Ltd.	lii
Harley, Thos., Ltd.	lviii
Harrison, T. & Co.	lviii
Holden, Arthur, & Sons, Ltd.	xviii

[Continued on p. vi

SUPERFINE SOYA FLOUR

An.. Arkady Product

The Soya Bean has been called "The Magic Bean" because it has so many uses — but no single Soya bean preparation will serve every purpose. Our slogan has always been "THE BETTER LOAF" and Bread has always been our chief job; therefore we concentrated on producing a Soya Flour especially for Bakers.

Our Superfine SOYA FLOUR for Bread

1. Improves the sheen on the crumb and bleaches the colour.
2. Mellows the dough — making it easier to mould.
3. Gives a moister and more velvety crumb.
4. Improves the keeping qualities of the bread.

You Just try it and See!

THE BRITISH ARKADY CO. LTD.
SKERTON ROAD · OLD TRAFFORD · MANCHESTER 16

TRADE MARK
GEORGE ELLISON
LIMITED
BIRMINGHAM 22 ENGLAND

451

Index to ADVERTISERS

	PAGE
Holden & Brooke, Ltd.	April
Honeywill & Stein, Ltd.	Ii
Hopkinsons, Ltd.	April
Horton Mfg. Co., Ltd.	Mar.
Imperial Chemical Industries, Ltd.	xxix
Jackson, J. G., & Crockatt & Co.	April
Jobling, James, & Co., Ltd.	xxx
Johnson, A., & Co., Ltd.	xi
Johnson, S. H., & Co., Ltd.	April
Jones, Samuel, & Co., Ltd.	lvi
Kellie, Robert, & Son, Ltd.	xx
Kestner Evaporator and Engineering Co., Ltd.	xxxii
Key Engineering Co., Ltd., The	lxii
Lambert, L., & Co.	April
Lautier Fils, Ltd.	xxxiv
Lax & Shaw, Ltd.	April
Lewis, H. K., & Co., Ltd.	lviii
London & Lancashire Assurance Co., Ltd.	xxxviii
Magneta Time Co., Ltd.	xxxiv
Magnetic Valve Co., Ltd.	xxxvi
Manesty Machines, Ltd.	xl
Marconi Instruments, Ltd.	xlv
Marshall's Malted Milk, Ltd.	xxxvi
Medway Corrugated Paper Co., Ltd.	xxi
Mellor, Bromley & Co., Ltd.	April
Midland Bank, Ltd.	Mar.
Mitchell, L. A., Ltd.	lxii
Moon Bros., Ltd.	Ii
Moore, Charles, Ltd.	Ii
Morton Machine Co., The	April
Morton, Robert, & Co., Ltd.	April
Musgrave & Co., Ltd.	xxx
National Adhesives, Ltd.	xvii
Negretti & Zambra, Ltd.	April
Newton Chambers, Ltd.	April
Northern Aluminium Co., Ltd	xix
Pearlite Box Co., Ltd.	Mar.
Perkin & Co., Ltd.	April
Philips Lamps, Ltd.	April
Pointing, L. J., & Son	lix
Polak & Schwarz, Ltd.	xxxi
Poppe Rubber & Tyre Co., Ltd.	xxviii
Porteus, G., & Sons	April
Premier Colloid Mills, Ltd.	April
Premier Filterpress Co., Ltd.	Mar.
Prodorite, Ltd.	xxxvii
Pulsometer Engineering Co. Ltd.	lxii
Purdy Patent Machinery Co. Ltd.	April
Radiovisor Parent, Ltd.	Feb.
Rat Campaign	xlvii
Reavell & Co., Ltd.	lxii
Rhodes, George, & Sons, Ltd.	lviii
Riddell, Cousland & Co., Ltd.	April
Robey & Co., Ltd.	xlix
Rownson, Drew & Clydesdale, Ltd.	xlvi
Rubber Latex, Ltd.	lxi
Ryvita, Ltd.	April
Sarco Thermostats Ltd.	liii
Saunders Valve Co., Ltd.	April
Seal-less Strapping, Ltd.	xliii
Short & Mason, Ltd.	April
SMALL ADVERTISEMENTS	lix-lxi
Soflor, Ltd.	liii
Soya Foods, Ltd.	xxxii
Sozol (1924), Ltd.	April
Spencer-Hopwood, Ltd.	April
Spiral Tube & Components Co., Ltd., The	lxi
Spirax Mfg. Co., Ltd.	April
Stevenson & Howell, Ltd.	xlvii
Sturge, J. & E., Ltd.	lx
Sturtevant Engineering Co., Ltd.	lv
Tecalemit, Ltd.	xlvi
Thackray, C. F., Ltd.	Mar.
Thames Board Mills, Ltd.	April
Thomas & Bishop, Ltd.	liv
Townson & Mercer, Ltd.	iii
United Glass Bottle Co., Ltd.	xiv
Walker, Crosweller & Co., Ltd.	xxiv
Walworth, Ltd.	xvi
Weir, G. & J., Ltd.	xxxvi
White, Tomkins & Courage, Ltd.	xxiii
Whittaker, A.	lxi

Simple Filtration—

HEAD to the sea, slow but steady to her purpose, she has steamed all night. The trawl has been down for a couple of hours, and now, once again, 'what have we got?' The 'cod' is untied—and the wriggling contents slither and flop into the pound. And so it goes on—day and night. A process of simple filtration—and the 'saving', the result, is your breakfast. The man who, in the dim and remote past, first consciously arranged his crude apparatus to gather fish, 'to stop this and let that go', is unknown to us.

But what he bequeathed to mankind has been developed to lengths that would astonish him. He would look with wonder on some of our triumphs, and only with difficulty be persuaded that their ingenuity solved problems of the same order as did his simple net, 'to stop this and let that go'.

BRITISH FILTERS LIMITED

AIRCRAFT HOUSE, MARKET HARBOROUGH

TRUSOY
Soya FLOUR

Supplies are now available

PROTEINS . 43·50%
FAT . . . 20·50%
CARBOHYDRATES 20·00%
ALL EXTREMELY IMPORTANT IN FOOD PRODUCTION TO-DAY

BRITISH Soya PRODUCTS LTD.

Telegrams: TRUSOY, BISHOP'S STORTFORD HERTS

Telephone: BISHOP'S STORTFORD 1110

Sales Office: **CHANTRY VILLA, CHANTRY ROAD.** Bishops Stortford. Herts.

All enquiries for Scotland to be sent to: Thomas Howden, Ltd., Craigentinny Avenue North, Leith, Edinburgh. All other enquiries direct to this address. Recipes and practical advice can be had on application from our representatives who cover all districts.

CHOCOLATE COUVERTURE PRICES CONTROLLED FROM APRIL 20th

How it works

1. The Minister of Food has made the Chocolate Couverture (Maximum Prices) Order 1942, which comes into force on April 20th and fixes maximum prices for all classes of Chocolate Couverture in accordance with a Schedule of Product Groups attached to the Order.

2. The Order applies only to Chocolate Couverture sold as such, and not to products in the manufacture of which Chocolate Couverture is used.

3. The Order covers all classes of Chocolate Couverture sold in accordance with Trade usage under that Trade description. This includes Chocolate for moulding; Chocolate for hand or machine covering of confectionery, centres, biscuits and ice-cream; soft cutting Chocolate used in the flour confectionery trade and generally known as "Bakers' Compounds"; unsweetened Chocolate (sometimes known as "Neatwork"); and miscellaneous Chocolate products for re-manufacture such as Chocolate Vermicelli and Chocolate Granulettes.

4. No Chocolate Couverture may be offered for sale unless it has been classified by the Cocoa and Chocolate (War Time) Association, acting for the Ministry, into one of the Product Groups shown in the panel on this page.

5. The following particulars must appear in distinctly legible words and figures on the wrapper or container of the Couverture, or upon a label attached to it, and also upon an invoice to be furnished to the buyer :—
   (*a*) The number of the Product Group.
   (*b*) The approved name or mark of the product.
   (*c*) The name or approved mark of the manufacturer.

   The number of the Product Group will generally appear in the standard symbol shown above.

If you are a User of Couverture

(*a*) The particulars as in 5 (*a*), (*b*) and (*c*) will appear on the label, wrapper, or container of all Couverture when delivered to you, and also on an invoice which you will receive for such goods

(*b*) You can see that you are not being overcharged, by checking the particulars given on the goods and in the invoice, and by reference to the panel on this page.

If you Buy Couverture for Resale as Couverture

(*a*) You must not remove, alter, deface or render illegible, the particulars as in 5 which will appear on the label, wrapper or container of the Couverture when delivered to you. If you divide a unit as delivered to you into smaller units for resale, you must pass on the particulars as in 5.

(*b*) You must not mix one classified Couverture line with another, nor alter the composition of any Couverture as delivered to you, without obtaining from the Cocoa and Chocolate (War Time) Association a new classification as a manufacturer.

(*c*) You must not sell the Couverture at prices higher than those in the panel on this page.

(*d*) You must furnish an invoice for all Couverture sold and it must contain the particulars as in 5.

(*e*) You must keep a record of the prices and quantities of Couverture bought and sold, and the names of the persons from whom the Couverture was bought or to whom it was sold.

If you are a Retailer

(*a*) You must not sell Couverture as Couverture by retail at a price exceeding that appropriate to its Product Group as shown in the panel on this page.

(*b*) If you sell Couverture by Retail as broken Chocolate, such sale would be governed by the Chocolate and Chocolate Confectionery (Maximum Prices) Order 1942. You must not charge a price exceeding 1/8*d.* per lb. unless the goods have been classified into one of the Product Groups given in the Schedule to that Order, and you must comply with the other provisions of the Chocolate and Chocolate Confectionery Order.

If you Manufacture Couverture

As a member of the Cocoa and Chocolate (War Time) Association you will have received a leaflet giving full particulars of the Scheme, together with a copy of the Order, and the Association's Official Record Card giving the classification of your goods.

PRODUCT GROUPS

Product Group Number	Maximum Price per net lb.	Product Group Number	Maximum Price per net lb.
K. 50 ..	1/3½*d.*	K. 55 ..	1/8½*d.*
K. 51 ..	1/4½*d.*	K. 56 ..	1/10½*d.*
K. 52 ..	1/1*d.*	K. 57 ..	2/0*d.*
K. 53 ..	1/3*d.*	K. 58 ..	1/0*d.*
K. 54 ..	1/6*d.*	K. 59 ..	9*d.*

NOTES

1. The maximum price for each group as given above includes the cost of packing materials and delivery, provided that an additional charge not exceeding 2*d.* per lb. may be made for deliveries of 56 lbs. or less.
2. The maximum price for each group as given above shall be reduced as follows :—
   (*a*) By not less than ½*d.* per lb. where the product is supplied in blocks of 40 lbs. or over.
   (*b*) By not less than ½*d.* per lb. for a delivery of 5 cwts. and under 1 ton.
   (*c*) By not less than ½*d.* per lb. for a delivery of 1 ton or over.

Issued by the Cocoa and Chocolate (War Time) Association, 104 Watergate Street, Chester

WITHOUT CORRECT LIGHTING IN THE FACTORIES THAT SUPPLY THE SERVICES, OUTPUT MUST SUFFER.

Good lighting, so closely allied to production and the welfare of workers, is vital. If your installation needs better planning—or changes are required here and there to take care of new processes—or extensions are necessary—consult the G.E.C. Take advantage of the knowledge G.E.C. lighting specialists have gained in helping wartime factories towards full production.

Consult the G.E.C.

FOR ANY STANDARD OF ILLUMINATION

WITH

Osram Lamps and **Osram** Fluorescent Tubes

Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2 I.E.7

NATIONAL CONCENTRATED FOODS

PROTEX

A Concentrated Extract with high Amino Acid content. Manufactured by Fredk. Boehm Ltd.

As a base, incorporated in foodstuffs, PROTEX has been accepted as a standard ingredient by the leading food manufacturers and is valued chiefly for its power of enhancing the characteristic flavour of almost any food preparation.

YEATEX

A Yeast Extract manufactured by the Trent Yeast Extract Co. Ltd., from Brewers' Yeast. Rich in Vitamin B. A most highly concentrated food, easily digested with the highest nutritional and health value. Possessing a pleasant aroma and flavour.

Sales Offices:

FREDK. BOEHM LTD.

ROWANHURST, GROVE ROAD, BEACONSFIELD, BUCKS

Telephone: Beaconsfield 378

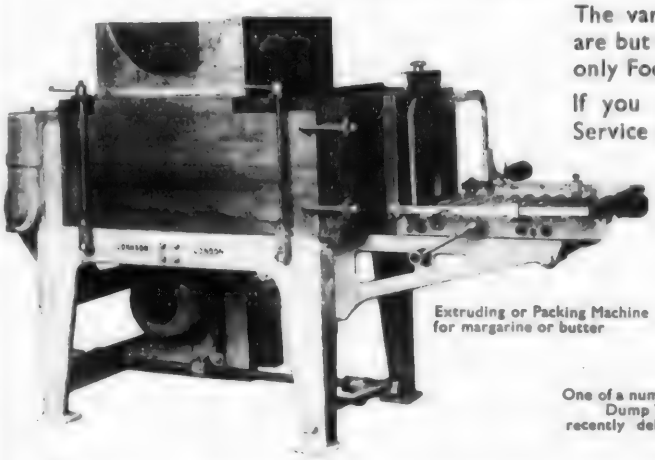
3,000 gallon Storage Tank nearing completion

STAINLESS STEEL

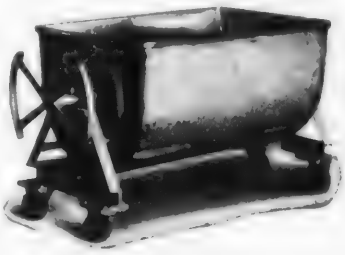
FOOD MANUFACTURING EQUIPMENT

The various types of Food Plant Equipment illustrated are but a few of the things we are making to help, not only Food Manufacturers, but also the National effort.

If you are engaged on essential work our Technical Service is at your disposal at all times.



Extruding or Packing Machine for margarine or butter



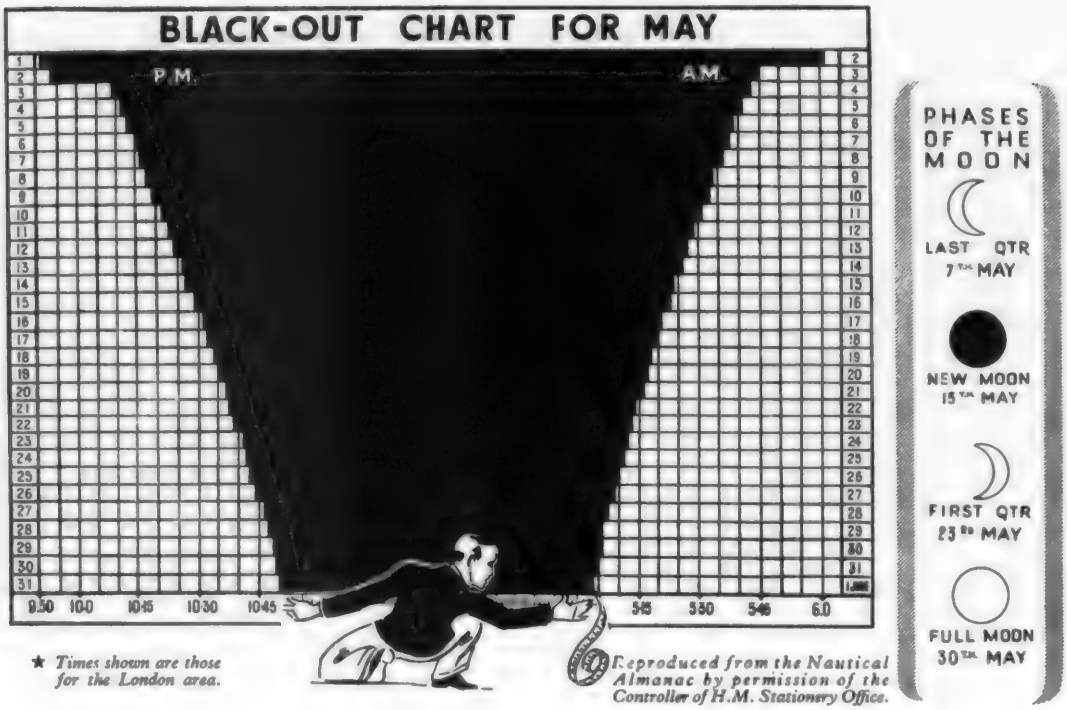
One of a number of Dump Trucks recently delivered

A. JOHNSON & CO. (LONDON) LTD.

AFRICA HOUSE, KINGSWAY, LONDON, W.C.2 Works: DUKE'S RD., ACTON, W.3

Coffee Percolators: part of an order for a well-known firm

The Black-out closes in . . . .



★ *Times shown are those for the London area.*

Reproduced from the Nautical Almanac by permission of the Controller of H.M. Stationery Office.

but . . . . emergency is closing in too, and while it is heartening to see the chart grow narrower, the pressure of production grows steadily.

There are still 24-hour shifts to be worked, and in permanently blacked-out factories artificial lighting has to be relied upon all the time. To maintain output, to lessen the strain on workers, lighting must be adequate.

Wherever you find high standards of lighting designed with an eye to the well-being of workers to secure improved output, there you will find OSRAM.

Osram

A G.E.C. PRODUCT

THE WONDERFUL LAMP

Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2

THE LAST WORD IN QUALITY AND EFFICIENCY

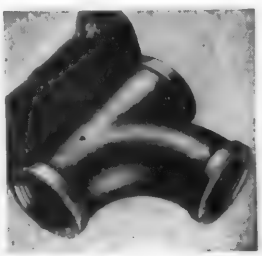
CRANE 'WHITEHALL' BOILERS

Despite the stress of present conditions, Crane 'Whitehall' Boilers still stand for quality and efficiency.

In addition to the outstanding design, features and conservative ratings, all users acknowledge the modern lines, ease of assembly and soundness of castings of Crane 'Whitehall' Boilers.

CRANE

VALVES
FITTINGS



& HEATING
EQUIPMENT

CRANE LTD 45/51 LEMAN STREET, LONDON, E.1
Branches at GLASGOW, BIRMINGHAM, BRISTOL, MANCHESTER

Glass CONTAINERS

display the product

and emphasize

its quality

YOUR CUSTOMERS SEE WHAT THEY BUY

★ Food Products have a more tempting appearance and consequently have a better sales appeal when packed in quality glass containers.

★ U.G.B. specialize in the manufacture of glass food containers—the registered trade mark U.G.B. embossed on the base is the "hall-mark" of quality, assuring clear crystal glass of great strength and accurate capacity.

The immense manufacturing resources of the United Glass Bottle Manufacturers Ltd. are sufficient to supply the bottles and glass containers of a most varied description needed throughout the Empire.

UNITED GLASS BOTTLE MANUFACTURERS LTD

Largest Manufacturers of Glass Containers in Europe

8, LEICESTER STREET, LONDON, W.C.2

Telephone: Gerrard 8611 (10 lines).
Telegrams: "Unglaboman, Lesquare, London."

CROMPTON

'MINOR' *f.h.p.* MOTORS

GREAT IN STAMINA

SMALL IN SIZE...

Compactness with maximum efficiency and reliability achieved by precision manufacture

CROMPTON PARKINSON *Limited*

No hand must be idle now

Supremacy in the shortest possible time

Interruption due to breakdown, loss of time through delayed delivery must be minimised.
If it is a question of TUBES—FITTINGS—VALVES or TOOLS let WALWORTH provide the best and quickest solution.

You can help us to supply your requirements for essential war work by showing on your orders the appropriate Government authority to buy.

WALWORTH
Means Service

LONDON: Walworth Ltd., 90-96 Union St., Southwark, S.E.1. 'Phone: Waterloo 7081

MANCHESTER: Walworth Ltd., 26 Bridge St., Deansgate, Manchester, 3. 'Phone: Blackfriars 6773

GLASGOW: Walworth Ltd., 48 York Street, Glasgow, C.1. 'Phone : Central 6879

THE "MIKAH" BOYS ARE STILL SMILING—AND MAKING THE BEST OF THINGS!

DOING THEIR PART TO KEEP THEIR CUSTOMERS SMILING TOO; BY MAINTAINING THE QUALITY AND THE SUPPLIES OF "MIKAH" ADHESIVES.

NATIONAL ADHESIVES LIMITED

SLOUGH, BUCKS

Telephone: Slough 23344

secure against any offensive...

SUPER ZINNATINE

Anti-acid, non-poisonous gold coating, preserves the rich fresh colour and flavour of fruits.

SULFATINE

The sulphur-resisting Zinnatine, prevents those blackening stains in vegetable packs.

ZINNATINE MARINA

Preserves the fresh sea flavour of fish, and provides a lacquer film that will not fracture in the process of deep drawing.

Zinnatine Lacquers make the complete organisation for the protection of canned foods. For fish, fruit or vegetables, there's a specially adapted Zinnatine Lacquer ministering to the special needs of each—a positive assurance of the perfect preservation of the natural properties of the food—and of absolute immunity from acid attack. Control the preservation of your canned goods to your own advantage—let Zinnatine Lacquers convert every tin to a place of safety. That is the protection that your customers appreciate—and that builds reputations and increases sales.

Established a Century

ARTHUR HOLDEN & SONS LTD.

BIRMINGHAM

WISDOM SUGGESTED *Aluminium!*

Aviation demanded lightness coupled with great strength. These properties were indispensable to progress and were found in 'Noral' aluminium alloys. It is no coincidence, therefore, that the rapid advance of flight followed the equally rapid progress in the technique of Aluminium fabrication.

Government sub-contractors using aluminium are invited to discuss their problems with our Research and Development Department.

NORTHERN ALUMINIUM COMPANY LIMITED

Head Office: Banbury, Oxfordshire

BOIL IN THE MODERN WAY

Let the "KELLIE" Extra-Rapid Jam Boiling Pan help you

Used in conjunction with our latest Automatic Pan Charging Plants
the output per Boiling Pan will easily reach 4 tons per day of 9 hours.

As pioneers and inventors of the "Kellie-Yates" Juice and Pomace preparing, extracting and filtering, distributing, charging and boiling plants we offer clients unrivalled technical and practical advantages based on our accumulated knowledge and experience and many years' active research work. Over 90 complete installations are now in operation in preserve factories throughout the world producing high-class preserves of finer flavour and greater clarity at a fraction of their former manufacturing costs.

LET US SEND YOU ILLUSTRATED LITERATURE. YOU'LL BE INTERESTED

ROBERT KELLIE & SON, LTD.

THE DUNDEE FOUNDRY **DUNDEE**

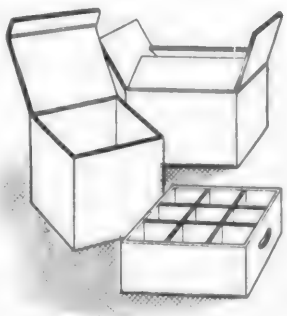
MAKERS OF FOOD PREPARING & CANNING MACHINERY & PLANTS

Telegraphic and Cable Address: "KELLIE," Dundee. Telephone: 2819 (3 lines)

Manchester Representative: A. E. FIELDING, Queen's Chambers, 2, Ridgefield, Manchester. Telephone: Blackfriars 0449.

Blossom Time

Few of us now can linger to admire the beauty of such a scene but the time will come when we can again appreciate its coloured magnificence. Then business too will flourish once more and the Medway Organisation which has already made its contribution to packing progress will be helping with its high standard of workmanship and its conscientious service.



MEDWAY

CORRUGATED CASES

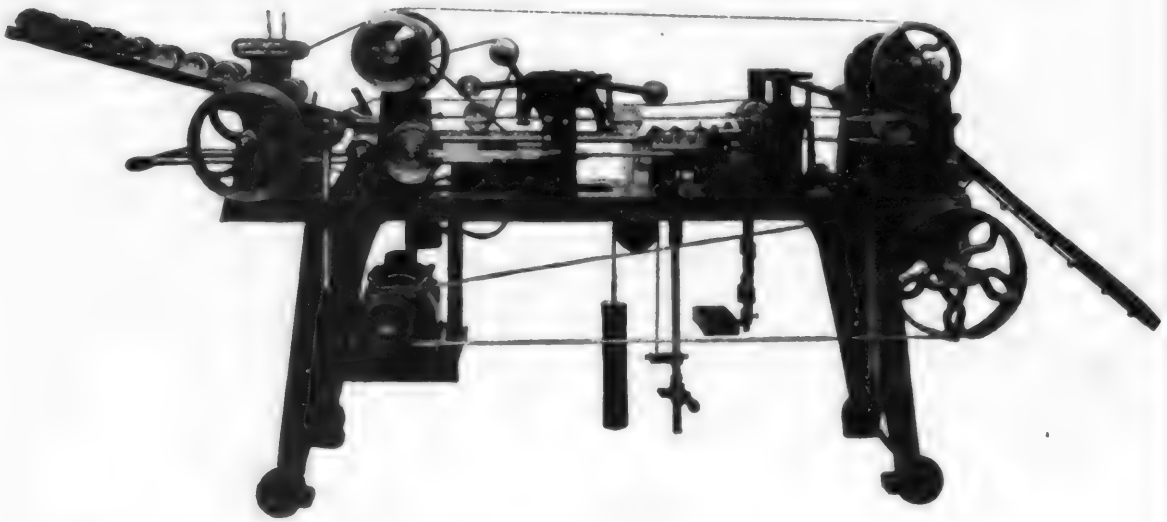
THE MEDWAY CORRUGATED PAPER CO. LTD.

London Sales Office:
BLACKFRIARS HOUSE, NEW BRIDGE STREET, E.C.4.

Provincial Sales Office:
LARKFIELD, MAIDSTONE, KENT.

"BETH" BRITISH

LABELLING MACHINES



★We are manufacturers, not agents, and have been manufacturing for the past 35 years. Buy from the makers and gain the advantage of their experience.

One Beth Labeller is adjustable to all round sizes. Will label any round can or package, with or without lids, at any desired speed without skilled operator and with very small power. The Paste does not touch the tin, therefore no rust is formed and brightly coloured labels are kept bright.
No waiting to dry.
Fitted with Castors, if desired.
Complete with or without electric motor-drive.

THE BETH LABEL & WRAPPER MACHINES LIMITED

Dagmar Road, London, N.4

Telephone: ARCHWAY 2933
Telegrams: "Labwrap, Finspark, London"

100 YEARS OF SUSTAINED SERVICE

It was in 1841 that the House of White, Tomkins and Courage Ltd. was established.

★ ★ ★ ★

Today the business is pre-eminent in its field; it having been built up by supplying the highest quality goods at reasonable prices.

★ ★ ★ ★

Large Mills and Factories are established in LONDON, LIVERPOOL, BELFAST, TANDRAGEE and REIGATE.

★ ★ ★ ★

The business in ESSENTIAL OILS, ESSENCES, FLAVOURINGS AND HARMLESS FOOD COLOURS is conducted from North Albert Works, Reigate.

★ ★ ★ ★

In peace and war the best possible service is given to the Trade by

WHITE, TOMKINS & COURAGE, Ltd.

NORTH ALBERT WORKS, REIGATE, SURREY

Phone: Reigate 2242 and 2243 **Grams: Esswhite, Reigate**

Of topical interest to

TIN PRINTERS, OPEN TOP CAN MANUFACTURERS AND FOOD PACKERS

HERE is a list of the principal Varnishes and Lacquers used at the present time by the Tin Printing and Canning Industry, and manufactured by Robt. Ingham Clark & Co. in association with R. Gay & Co.

FOR TINPLATE PRINTERS

Pasteurising Stoving Varnish (Deodorised),
White Dial Stoving Varnish, Silver Stoving Varnish,
Pale Elastic Stoving Varnish, Tinplate Stoving Varnish,
Non-poisonous Gold Stoving Varnish,
Gold Stoving Varnish (Self coloured),
Retorting and Acid Resisting Gold Stoving Varnish,
Coating Sizes for Coloured Stoving Enamels,
Stoving Coating Enamels in agreed shades.
Black Stove Enamels (Dull and Glossy),
Translucent Coloured Stoving Lacquers in agreed shades.

FOR OPEN TOP CAN MANUFACTURERS

ORCHALINE. An anti-acid Lacquer for the insides of Fruit Cans.
ANTISULVA. A sulphur-resisting Lacquer for the insides of Vegetable Cans.
HAM LACQUER. For internal coating of Ham Tins.

TENTEN LACQUER—FOR BLACK IRON PLATES

This double-sided Lacquer is an outstanding rust-preventative. It is non-poisonous, Acid Resisting and Odourless.

All the above specially made for Stoving in Automatic or Box Stoves.

FOR FOOD PACKERS

AIR DRYING GOLD LACQUER & AIR DRYING BLUE LACQUER

Both the above supplied in all shades for the exterior of Food Cans.

ROBT INGHAM CLARK & Co. and R. GAY & Co., Witley Court, Witley, Surrey.

Telephone: WORMLEY 280-4

LONDON OFFICE: 6 ARLINGTON STREET, S.W.1 (TELEPHONE: REGENT 0881)

●

If you are engaged also on Munitions and Armaments work, write for a copy of our "WAR SUPPLIES CATALOGUE," it contains valuable data for buyers and users of Paints, Varnishes, Lacquers, etc., to specification.

Instant Hot Water from steam and cold water

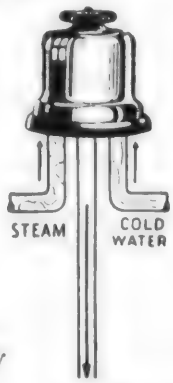
A Leonard-Thermostatic Steam and Water Mixing Valve serving soup boiling pans.
Courtesy of Messrs. Crosse & Blackwell Ltd.

The most economical way to get hot water is to put live steam through a Leonard-Thermostatic Steam and Water Mixer.

By means of a quick-acting bi-metallic thermostat within the Mixer, the temperature at the outflow remains steady in spite of varying pressures.

The control is automatic and is maintained by a stainless steel thermostat.

A typical application is shown above. Hot water at the correct temperature is supplied to soup boiling pans by one of our Leonard-Thermostatic Steam and Water Mixers, type DS.



Specify

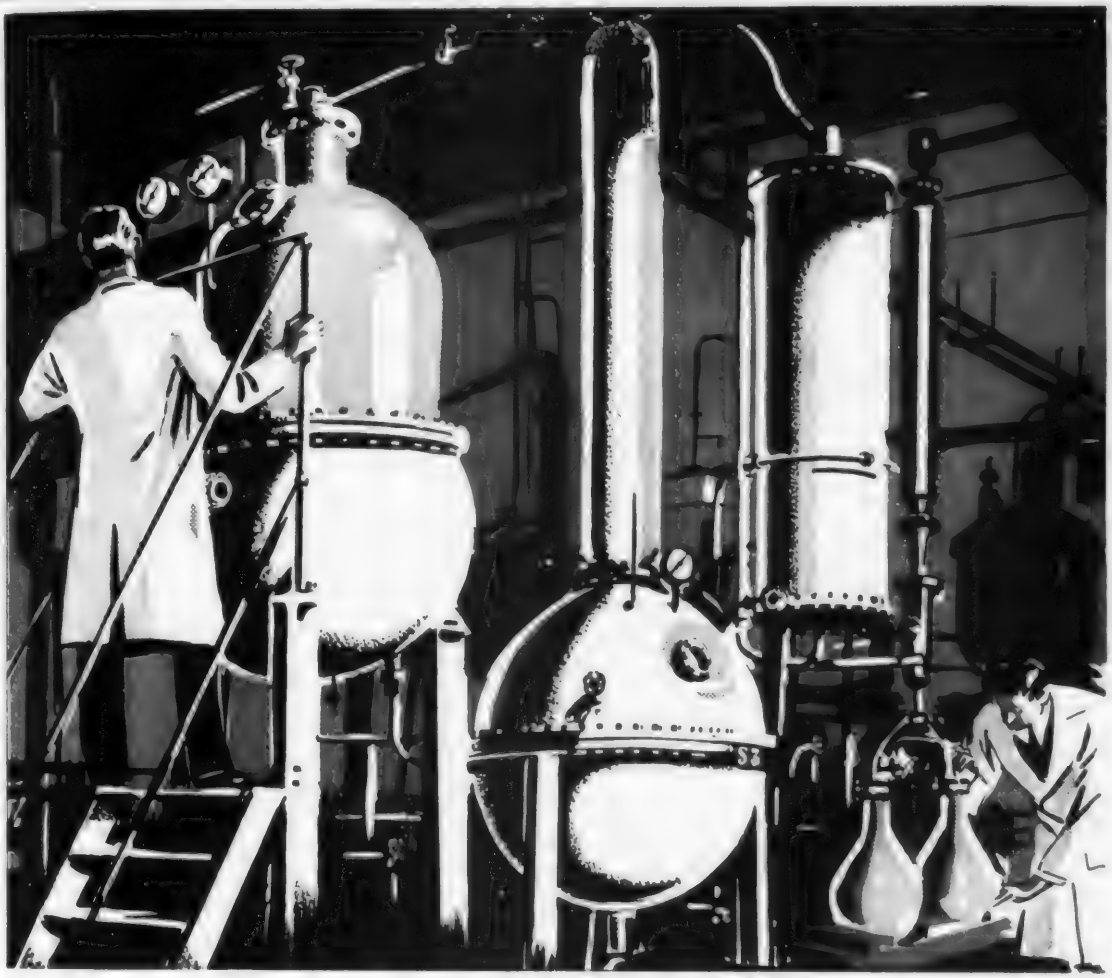
Leonard-Thermostatic

steam and water mixers for process and washing down

WALKER, CROSWELLER & CO. LTD.

CHELTENHAM and London

61-1142



ESSENTIAL OILS

Fine Quality in Essential Oils is not readily defined. Nor is it to be secured automatically—for even the most up-to-date scientific control of distillation still leaves ample scope for individual craftsmanship. We take it, therefore, as a tribute both to our skill and to the knowledge weh ave accumulated since 1833 that StaffAllenS Essential Oils should be recognised throughout the world, and everywhere accepted for their superior quality.

CLOVE OIL • LAVENDER OIL • NUTMEG OIL • CASCARILLA OIL • PEPPERMINT OIL • ETC.

StaffAllenS

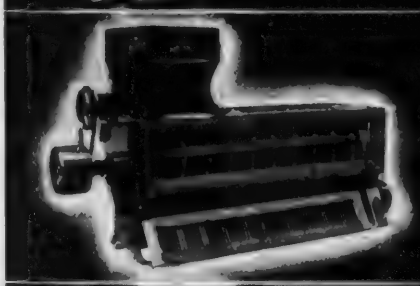
STAFFORD ALLEN & SONS LTD
WHARF ROAD, LONDON, N.1.
Phone: Clerkenwell 1000 (7 lines)

TAS/AL72.

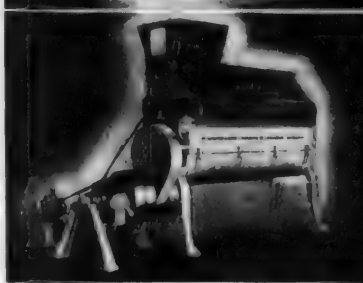
In the forefront of the food front

GARDNER'S machinery for the food industry is used all over the world. A reputation for unfailing reliability and long working life . . . plus labour-saving operation . . . gives them priority over all other types. Sifting and mixing with GARDNER "Rapid" Sifters and Mixers guarantees a perfectly proportioned blend, however diverse the proportions of the ingredients. For the addition of essences, the sprayer combination is recommended. Fine Powder dressing is a simple matter if GARDNER'S "Rapid" Dresser is employed. Smooth texture and freedom from grit is ensured automatically; the dressing cylinder can be changed and the machine cleaned in a few minutes. Write for full particulars and catalogue of GARDNER machinery for the food-processing industry. There is a model to do your particular job better than it has been done before.

The GARDNER *Combined Patent 'Rapid'* STREAMLINED SIFTER & MIXER



The GARDNER *Patent 'Quick Change'* FINE POWDER DRESSER



The GARDNER *Combined Patent 'Rapid'* SIFTER & MIXER with SPRAYER

The GARDNER *Patent 'Rapid'* MIXER WITH AUTOMATIC SAFETY COVER

GARDNER'S *Machinery for* **SIFTING MIXING · SPRAYING · DRESSING**

WM. GARDNER & SONS (GLOUCESTER) **LTD., BRISTOL ROAD, GLOUCESTER**

Telephone : 2288 (3 lines) *Telegrams : "Gardner, Gloucester."*

LONDON: 19 Grays Inn Chambers; 20, High Holborn, W.C. 1 *Telephone : Chancery 7347*

A Hanging Matter

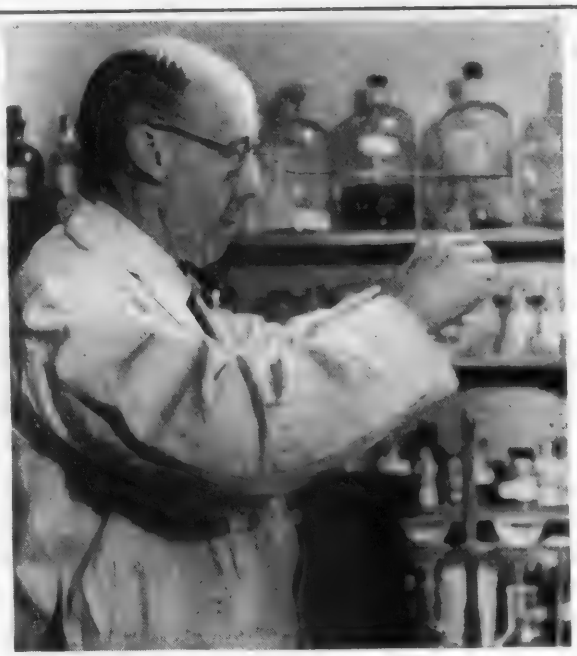
Why do you buy reflectors? Surely it is to provide your workers with light so that they can see well and so can work well. That is what Benjamin ensures for you. Not only do Benjamin make the best reflectors but Benjamin Engineers plan the installation for you (or for your contractors) so that you will be sure of the most suitable lighting for your operatives.

BENJAMIN

LIGHTING

The Benjamin Electric Ltd., Brantwood Works, Tottenham, London, N.17.

Telegrams : "Benjalect, Southtot, London." Telephone : Tottenham 5252 (5 lines). 1137



"PROTECTION"

Purity of Food Products is always a first consideration, and it is obvious that the Rubber Ring used to seal the Food Container must not contaminate the product in any way.

Every economy must be effected in the use of raw rubber, and as usual our technical staff are constantly checking and controlling the purity of the ingredients used in the manufacture of guaranteed quality Poppe Rubber Rings.

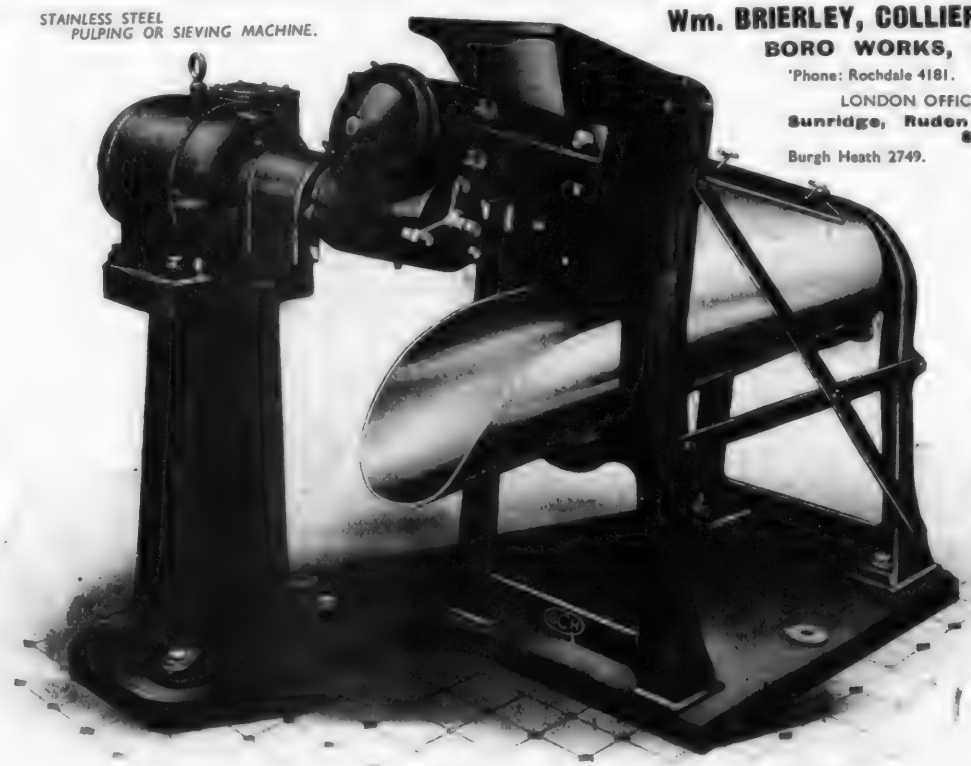
POPPE RUBBER RINGS — PROTECT PURITY!

THE POPPE RUBBER & TYRE COMPANY LIMITED

TWICKENHAM **MIDDLESEX**

Telephone: POPESGROVE 2271 (3 lines). **Telegrams: POPPE, TWICKENHAM**

STAINLESS STEEL PULPING OR SIEVING MACHINE.



Wm. BRIERLEY, COLLIER & HARTLEY LTD.

BORO WORKS, ROCHDALE

'Phone: Rochdale 4181. 'Grams: "Bricohar, Rochdale."

LONDON OFFICE—Temporary Address:
Sunridge, Rudon Way, Epsom Downs, Surrey.

Burgh Heath 2749. "Bricohar, Phone, London."

ALL TYPES* FOOD PROCESSING and FRUIT PRESERVING *MACHINERY

consult

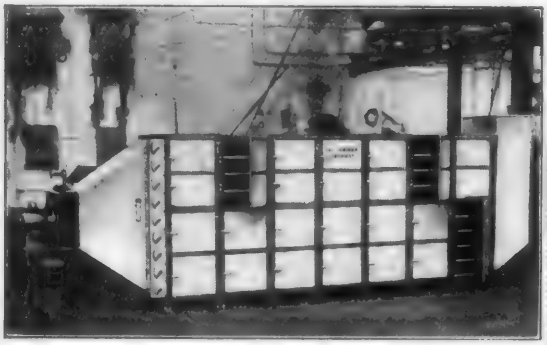
BCH

ABOVE THE SALT

AT the household table of the middle ages the saltcellar was the symbol of class distinction. It separated the lord, his lady, their guests and privileged men, who sat "above the salt," from the menials and retainers who sat "below" it. The saltcellar has long since lost this symbolic meaning, but it remains a witness to the need of the human body for salt. Only a very small part of the salt consumed in food actually comes from the saltcellar. Much more reaches the table in butter, and bacon, or in other cured or preserved foods. But the total quantity of salt used for domestic purposes is trifling compared with the huge tonnages taken by Industry. Salt is one of the more important chemicals with which Nature has enriched the British Isles. It occurs in different parts of the United Kingdom in extensive beds formed by the drying up, in remote ages, of inland seas. The layer of salt in course of time became buried, and is known as rock salt. But only a little of the salt used today is obtained by mining this rock. By far the greater part is made by evaporating the brine which results when rock salt is dissolved either naturally by surface water which seeps through to the beds, or by water specially introduced through bore-holes. In some salt fields the natural brine rises to the surface and here salt has been made since the Roman occupation of Britain. Either as a mineral or as brine salt is the raw material for the manufacture of a wide range of important chemicals which are in their turn the raw material for many industries. Glass and soap-making, for example, use great quantities of alkali, which is made from brine and limestone. The dye-stuffs, textile and paper-making industries could not be carried on without chemicals based on salt. Salt is used in the manufacture of non-ferrous metals and to some extent in agriculture. British salt is shipped overseas to form an extensive export trade. It is the responsibility of the British chemical industry not only to ensure that British salt beds are efficiently developed and used, but by constant research to improve upon ways of using salt to the benefit of Industry and the public.

ICI

Imperial Chemical Industries Limited, London, S.W.1



FOR ALL CLASSES OF

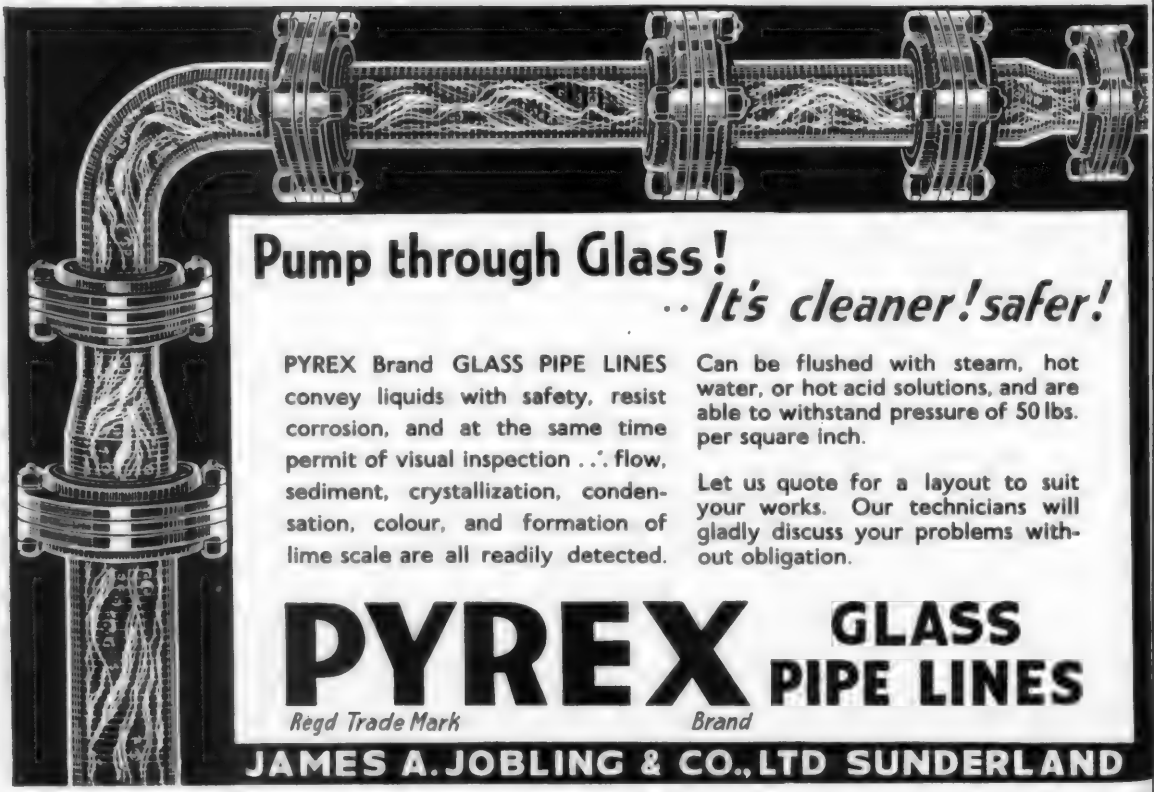
DRYING EQUIPMENT

Compartment Dryers
Tunnel Dryers
Conveyor Dryers
for all materials

Specialists in the design and construction of all types of Dryers, our wide experience is at your disposal. Let us advise you as to the most efficient and economical plant suitable for your own particular purpose. The illustration shows a Musgrave Cupboard Dryer for Confectionery.

Musgrave and Company Limited

Brettenham House, Lancaster Place, London, W.C.2
BELFAST · GLASGOW · MANCHESTER · BRISTOL · CARDIFF



Pump through Glass!
.. It's cleaner! safer!

PYREX Brand GLASS PIPE LINES convey liquids with safety, resist corrosion, and at the same time permit of visual inspection . . . flow, sediment, crystallization, condensation, colour, and formation of lime scale are all readily detected.

Can be flushed with steam, hot water, or hot acid solutions, and are able to withstand pressure of 50 lbs. per square inch.

Let us quote for a layout to suit your works. Our technicians will gladly discuss your problems without obligation.

PYREX *Regd Trade Mark* *Brand* **GLASS PIPE LINES**

JAMES A. JOBLING & CO., LTD SUNDERLAND

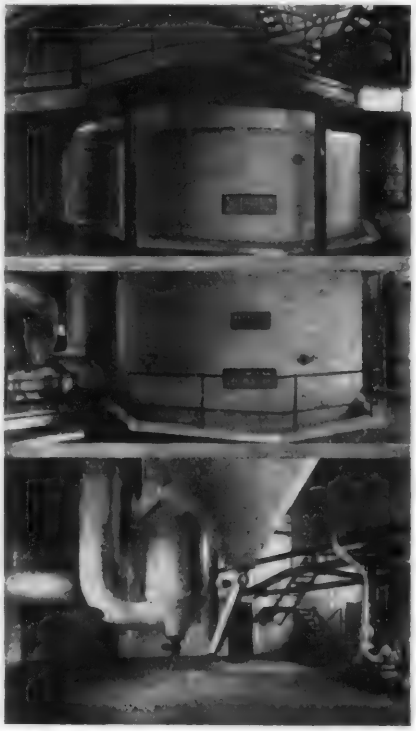
ALWAYS THE REAL THING

POLAK & SCHWARZ
(ENGLAND) LTD.

FRUIT ESSENCES . . . JUICES,
PASTES, ETC.

50. GREAT CAMBRIDGE ROAD. ENFIELD. MIDDLESEX

TELEPHONES : ENFIELD 3244-5 & 2573



FOOD PRODUCTS

can be prepared as a dry powder on the Kestner Patent Spray Drier as shown more **EASILY, CHEAPLY,** and **EFFICIENTLY** than by any other method.

Write for Leaflet No. 264

KESTNER EVAPORATOR & ENGINEERING CO. LTD.

Chemical Engineers 5, Grosvenor Gardens, London, S.W.1

SOYA FLOUR

is in free supply and we recommend trials with

SOYOLK

the pioneer, edible soya flour containing 40°/₀ Protein. 20°/₀ Fat 2½°/₀ Lecithin.

Samples at wholesale rates and particulars from—

SOYA FOODS LIMITED

Offices : **ELSTREE** *'Phone :* 2421/2/3 *Works :* **RICKMANSWORTH**

Two "Broadbent" 54" Belt-Driven Centrifugals with Lift-out, Tip-over Baskets and Overhead Runway

BROADBENT CENTRIFUGALS

STANDARD DESIGNS IN A VARIETY OF SIZES FOR STEAM, BELT, MOTOR OR DIRECT ELECTRIC DRIVE.

FIXED OR LIFT-OUT BASKETS, WITH STAINLESS STEEL OR MONEL FITMENTS THROUGHOUT.

ALSO SPECIAL DESIGNS FOR SECRET PROCESSES.

Ask for Catalogue No. 3936

ARE USED IN THE MANUFACTURE
OF MOST OF THE
WORLD-FAMOUS FOOD PRODUCTS

MAXIMUM FILTRATION, CLEANLINESS
AND
MECHANICAL RELIABILITY GUARANTEED

Literature and Technical Information on request

CUSTOMERS' PRODUCTS TESTED FREE OF CHARGE

FOR DRYING, FILTERING, DE-LIQUORING OR PRECIPITATING ALL KINDS OF FOOD PRODUCTS DURING PROCESSING STAGES.

USED FOR
FILTERING FROZEN EGGS
COFFEE ESSENCE GROUNDS
BREAD FOR SAUSAGES
POTATO CRISPS & PULPS
MEAT EXTRACTS
INFANT FOODS
RECLAIMING SOLIDS FROM LIQUOR
RECLAIMING OIL FROM OFFALS
RECOVERING CRYSTALS
Etc., Etc.
Almost Unlimited Uses

THOMAS BROADBENT & SONS LTD., HUDDERSFIELD

TELEPHONE: 1581 (4 lines) *HUDDERSFIELD*

LONDON · LEICESTER · MANCHESTER · NEWCASTLE · GLASGOW

TELEGRAMS: BROADBENT, HUDDERSFIELD

AMPHORA

MEANS
PRODUCTS
HAVING
OUTSTANDINGLY
RICH
AROMAS

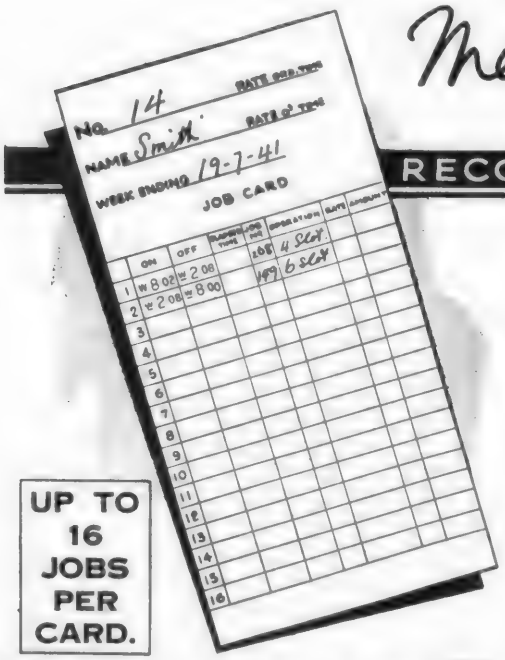
None but the Best bears the Trade Mark

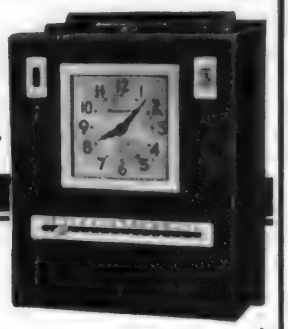
LAUTIER FILS LTD.
POWER ROAD, CHISWICK
LONDON, W. 4

CHISWICK 1696
(3 lines)

LAUTIERFIS
LONDON

Mechanically Correct
RECORDS OF TIME





UP TO 16 JOBS PER CARD.

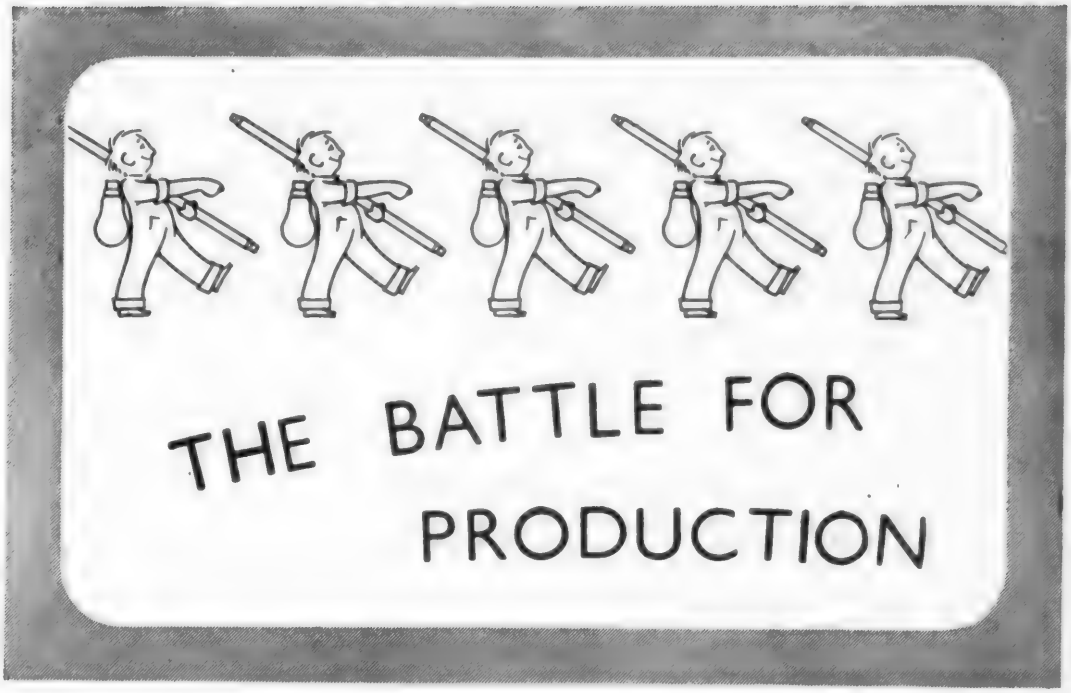
MAGNETA
JOB COSTERS

- Accurate production time records
- One-hand push bar mechanism.
- Speedier recording.
- Applicable to any cost system.
- Mains or Master Clock controlled.

THE MAGNETA TIME COMPANY LTD

HEAD OFFICE GOBLIN WORKS, ERMYN WAY, LEATHERHEAD, SURREY TELEPHONE ASHTEAD 866 (8 LINES)

LONDON OFFICE: 53/54, HAYMARKET, S.W.1. TELEPHONE: ABBEY 2366-7



In the battle for production, light is, after man-power and material, the most important weapon available to industry. Workers must go into action with the very best kind of lighting you can give them—lighting based on the B T H Light-Conditioning Code. This Code shows how lighting should be arranged in order to make possible maximum production.

Let B T H Lighting Engineers help you to plan efficient lighting for production and welfare.

MAZDA Lamps
with MAZDALUX Equipment

M3941 *B T H for all Electrical Plant and Equipment*

THE BRITISH THOMSON-HOUSTON CO., LTD., CROWN HOUSE, ALDWYCH, LONDON, W.C.2.

Make a memo

Marshall's

HELP TO
NOURISH the NATION

MANUFACTURERS AND BLENDERS of PACKETED TABLE FOODS

Contractors to H.M. Government.

Trade Enquiries: **MARSHALL'S MALTED MILK LTD.**
45 Effra Parade, Brixton, London, S.W.2. Telephones : Brixton 7441/2/3

UNFAILING TEMPERATURE CONTROL

Let Magnetic Valves take complete charge of your system of temperature control. They need no watching, no supervision—Magnetic Valves maintain temperature thermostatically and so save valuable man and woman power. Easy to fit to existing installations, the Magnetic Valve Control System has many applications in industry. May we send you details?

THE MAGNETIC VALVE CO. LTD.
ALDWYCH HOUSE, LONDON, W.C.2 Phone: Temple Bar 7777

Weir Homogenisers

produce thoroughly stable emulsions and prevent separation. Built of stainless materials, easy to clean. Continuous operation fits well into line production.

G. & J. WEIR LTD
AUXILIARY MACHINERY SPECIALISTS
CATHCART GLASGOW

AN ACID-PROOF FLOOR LAID BY PRODORITE LTD.

Flooring!

FOR FINEST QUALITY AND LASTING SATISFACTION CONSULT

Industry is rapidly learning the value and economy of

A SPECIFIC FLOOR FOR A PARTICULAR PURPOSE

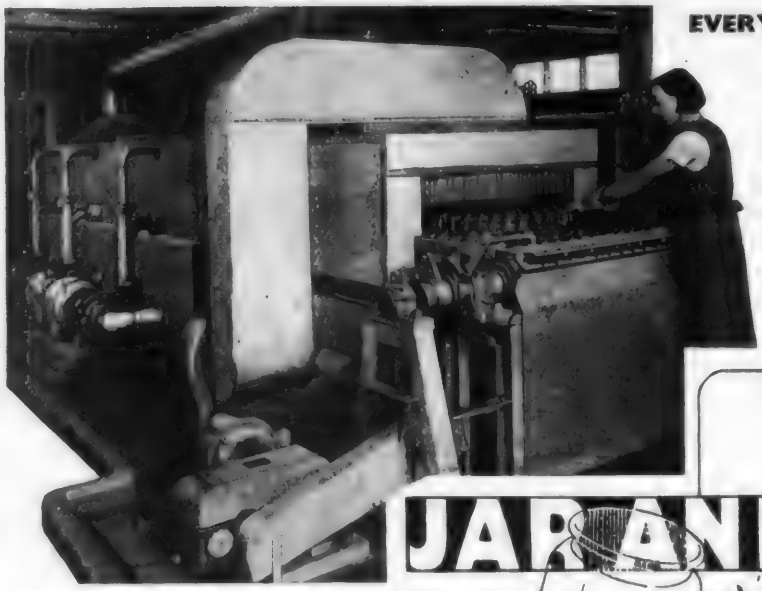
We have spent fifteen years in research and practical work in connection with floor surfaces of every description, acid-proof and non-acid. We have a large modern Works, a fully equipped Laboratory and excellent Drawing Office facilities, and are therefore in a unique position to advise regarding ANY FLOORING PROBLEM put up to us.

May we help you?

PRODORITE LTD

EAGLE WORKS
WEDNESBURY, Staffs
Phone : WEDnesbury 0284
(Private Branch Exchange)

Artillery House
Artillery Row
LONDON, S.W.1
Phone : ABBey 1547 & 1548



EVERY UTENSIL AND CONTAINER

A Dawson Utensil and Container Cleaning Hydro can be constructed for washing tins, jars, bottles, moulds, trays, baking boards, mixers, basins, bowls, buckets or any other equipment used in Food Industry. Suggestions and specifications will be supplied in response to enquiries stating type of articles to be cleaned.

DAWSON BROS. LTD.

Head Office and Works:
VENTNOR WORKS, GOMERSAL, LEEDS.
Telephone: Cleckheaton 265 (2 lines).
London Address:
Roding Lane, Southend Rd., Woodford Green, Essex.
Telephone: Wanstead 0481.
Established 1864.

Dawson
JAR AND BOTTLE
washing machines

are installed by many leading Dairies, Breweries and food packers throughout the country for high speed washing of large quantities of bottles and jars of all sizes and types. Outputs up to 1,000 dozens per hour. Machine for washing and drying small glass jars is illustrated. Output 7,000 per hour.

INSURE WITH

THE LONDON & LANCASHIRE INSURANCE Co LTD

For Prospectus, and full information on all classes of Insurance, write to:

Chief Administration:
7, Chancery Lane, London, W.C.2

"NON-SCORCH" 461804 (Chevler Regd.)

PAPER BAKING CASES

Made in large variety of shapes and sizes.
Indents through Merchants and Shippers.

MAKERS ALSO OF FLAN AND TART TRAYS,

Waxed Jelly Cases, Cake Frillings, Plate Papers, etc., for Wholesale and Retail Bakers and Confectioners.

CHEVERTON & LAIDLER,
Manufacturers of Paper Food Containers,
Chevler Road, Princes Risboro', England.

Keen Agents with Bakery connections (export) wanted. Send fullest particulars and British references.

British Manufacture Throughout

Tinplates and Blackplates

The Baldwin range includes a branded Tinplate for every purpose. These Tinplates are STANDARD brands regularly used in all parts of the world for every kind of canning and deep stamping work.

As the original makers of Open Hearth Siemens Basic Steel with complete control of materials from iron ore to finished product, Baldwins are able to offer exceptional advantages to users of Tinplate.

Strictly competitive prices for all grades and qualities quoted on request.

Baldwins Ltd.

Registered and Head Office : P.O. Box 255, 6 Broadway, Westminster, London, S.W.1
Telephone : Abbey 1853. 'Grams : "Balwinza, Rand, London."
Cables : "Balwinza, London."
South Wales Branch and Collieries Office : 45 Wind Street, Swansea
'Phone : Swansea 4941 (8 lines). 'Grams : "Baldwins, Swansea."
London Sales Office : P.O. Box 255, 6 Broadway, Westminster
'Phone : Abbey 1853. 'Grams : "Promptitude, Rand, London."
Cables : "Promptitude, London."
On Admiralty, War Office, Air Ministry, Board of Trade, Lloyds, British Corporation and other lists.

DISTILLED WATER

A VITAL WARTIME NECESSITY

•

We can still supply the famous range of

MANESTY

AUTOMATIC WATER STILLS

All the latest Manesty Water Stills have several new features, including the Pyrex Glass Cover, Pyrex Glass Triple Vapour Baffle and new Automatic Water Feed Regulator.

ENTIRELY BRITISH MADE

•

Manesty Water Stills are made in 12 distinct models operating by Gas, Steam, Electricity, or Paraffin, with outputs varying from 2 pints to 50 gallons per hour.

•

Send a postcard and we will send you particulars of any or all of these Stills

MANESTY MACHINES LTD.

4a SPEKE HALL ROAD, LIVERPOOL 19

Telegrams: MANESTY, LIVERPOOL

Telephone: HUNTS CROSS 1321

FOOD MANUFACTURE

Vol. XVII. · Published Monthly · May, 1942

Contents

Editorial - - - - - - - 113

Wartime Manufacture of Jam and Marmalade. *F. C. E. Read* - 116

The Common Eel. *Elliott B. Dewberry, M.R.I.P.H., M.R.San.I.* - 118

The Contamination of Foods by Poison Gases. Part II. *W. R. Wooldridge, Ph.D., M.Sc., M.R.C.V.S.* - - 123

Potatoes for Chip Making. *Specially Contributed* - - - - - - 126

The National Bread. *Sir Ernest Graham-Little, M.D., F.R.C.P., M.P.* - - 128

Refrigeration Engineering in Emergency Cold Stores - - - 129

Wartime Packaging - - - - 133

Book Reviews - - - - - 134

News from the Industry - - - 136

Information and Advice - - - 143

Recent Patents, Trade Marks, and New Companies- - - - 144

Published by Leonard Hill Limited, 17, Stratford Place, London, W.1. (*Mayfair 7383*)
Annual Subscription, 10s. Abroad, 12s. 6d. Single Copies, 1s.

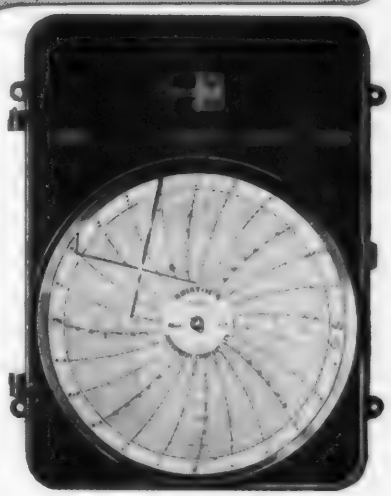
BRISTOL'S

RECORDING THERMOMETERS

AND FREE VANE TEMPERATURE CONTROLLERS

Cadburys use them....

Bristol's Recording Thermometers are made in three specialised types, Vapour Pressure, Gas and Liquid Filled. They cover from — 60 to + 1000° F. They are sensitive, permanently accurate and reliable. In controller form, incorporating our pneumatically operated Free Vane, they automatically regulate the supply of heat to the autoclave, pan or oven and eliminate all need for manual adjustment.



BRISTOL'S INSTRUMENT Co., Ltd., LONDON, N.W.10.

Until then . . . When building a better Britain is the peaceful task of brains and brawn many a Fordson and Thames Commercial Vehicle will be busy supplying material for the plots that will end in happy homes. Until then, these commercial vehicles, kept efficient by the unique Ford Service and Spare Parts Facilities, form an endless chain of supply along the lines of communication between our factories and our Allies.

The following models are available against M.O.W.T. permits (through Regional Transport Commissioners) 10 cwt. Fordson, 25/35 cwt. Thames and 4/6 ton Thames.

Fordson & Thames

FORD MOTOR COMPANY LIMITED, DAGENHAM, ESSEX. LONDON SHOWROOMS: 88, REGENT STREET, W.1

FOOD MANUFACTURE

Vol. XVII, No. 5 May 1, 1942

Food Storing

FRESH in the memory of the public is the exhortation of the Government to store food against emergency. Some apprehension was caused in the minds of householders at the news of a heavy fine recently imposed for food hoarding, although in that particular case the quantities were excessive. Prudent housewives are somewhat bewildered and are wondering whether they are in danger of impeachment. The statement made in the House of Commons that sufficient food for four weeks may be stored might at first sight be considered reassuring to them, but it is highly probable that in many larders there are more than four weeks' stocks of some foods and considerably less of others. What should be done? The position should be clarified.

The Government have told us about their caches of foods dispersed over the country. The food manufacturers have considerable stocks. Might it not be wise that these be supplemented by further stores of such foods, the production of which are being maintained, in millions of those small depots which form the larders and storerooms of the nation? The machinery for inspection and control adequate to prevent abuses is already organised. In the case of extreme urgency, when the powers given to local organisations are put into effect, it should not be difficult to draw upon part of these stocks for the benefit of those unfortunate enough not to have been able to store any for economic or other reasons. The advantages of ready availability of such stocks in localised areas, possibly cut off from any kind of transport, are obvious.

Digestibility of National Wheatmeal

Assuming that the conclusion arrived at will bear the scrutiny and criticism to which it will doubtless be subjected, the article by Drs. H. A. Krebs and Kenneth Mellanby published in the *Lancet* of March 14 may put to rest some of the forebodings produced by recent elimination of white bread from the nation's diet. Discussing the opinion expressed by N. C. Wright that a large portion of the extra flour obtained by raising the level of extraction in national wheatmeal from 75 to 85 per cent. cannot be digested, and is therefore lost, the authors observe that no experimental data have so far been published on the digestibility of national wheatmeal. To fill this gap the experiments reported in the paper were carried out. In the course of giving full details of the experiments, which involved keeping six adult male volunteers on a diet containing 480 to 700 g. of national wheatmeal or white flour of 75 per cent. extraction per day, the authors point out that "digestibility" in their paper is defined as the value of:

$$1 - \frac{\text{amount of food residue in fæces}}{\text{amount of food ingested}} \times 100$$

The figure for digestibility indicates the percentage of the food disappearing during the passage through the digestive tract. "Digested" food is not necessarily identical with food utilised by the body, for the former includes substances absorbed by the gut and excreted by the urine, and also material utilised by the bacteria of the gut.

The authors found that on the average 94 per cent. of the dry matter and 89 per cent. of the nitrogen of national flour were digested. In the case of white flour of 75 per cent. extraction approximately 97 per cent. of dry matter was digested. It follows from the data published by Macrae and others that the digestibility of the white flour nitrogen is approximately 91 per cent. The views put forward by N. C. Wright (state the authors) against raising the extraction of wheat to 85 per cent. (which in the absence of reliable data on the digestibility of the two flours were admittedly provisional) are not substantiated by the new data. The difference in the digestibility of the two flours is much smaller than was assumed by Wright.

Fresh and Processed Peas

From time to time we have stressed the confusion existing in the average consumer's mind in the matter of canned fresh garden and processed peas, and have urged that the label should fulfil the function of differentiation between the two varieties. It is interesting to note the remarks made by the chairman of United Canners Limited at the company's tenth ordinary general meeting held at the end of March. Stating that canned peas are now rationed under the "points" scheme, the chairman regrets that no difference has been made in the number of points required for fresh garden and processed peas. He is of the

opinion that the Government has missed a splendid opportunity to distinguish once and for all between them, and that it has encouraged the public to think that they are one and the same thing. He hoped that when this matter had been further considered there may be yet an alteration in the basis of the points required to purchase these two products.

In claiming that the company's own labels clearly indicate the nature of the products, the chairman deplored the fact that certain packers before the war had not done so, and that he had called the attention to the Board of Trade to these, but no action had been taken.

Apart from having some doubts as to the propriety during wartime of the canning of processed peas at all, we feel that a more direct way than the allotment of points would clarify the position —a clear statement on the processed peas label that the contents of the can are *soaked dried peas.*

Industrial Dusts

Among a number of products which are liable to explode or burn under appropriate conditions are sugar, dextrine, cocoa, various cereal dusts, malt, and tea.

The extent to which protection is needed against the risk of fire and explosion is not generally realised, states Mr. Kenneth L. Goodall, H.M. Engineering Inspector of Factories, in an article in the *Journal of Scientific Instruments*, XIX, No. 3, March, 1942, entitled "Physics and Protection Against Industrial Dust."

Industrial dust presents two main hazards to the workers in factories: (1) risks to health, (2) risks to life through fire and explosion. In connection with the estimation of the dust health hazard, it is of importance for the physiologist to have available a knowledge of the concentration (in number of particles per unit volume), the size distribution, mass per unit volume, and mineralogical nature and chemical composition of the airborne dusts which are breathed by industrial workers, with known duration of exposure to the dusts. Physicists have devised a number of ingenious instruments for these and allied purposes. Having obtained the necessary data on the amount and nature of the dust being breathed by workers, methods of protection can be devised. Representative methods are described by the author. Safety measures against dust-cloud fires and explosions aim fundamentally at keeping concentrations outside (and in practice usually below) the inflammable concentration limits and avoiding sources of ignition, and if this is not successfully achieved and a fire or explosion should result the aim should be so to design the plant and arrange the manner of working the process that a minimum damage to workers and plant should result.

In the investigation of such problems physicists must play a large and ever-increasing part.

Ash Content of Tea

The importance, from the standpoint of food and drug regulations, of a knowledge of the ash content of tea has led J. Lamb to investigate the matter in so far as it relates to Ceylon teas, produced under a wide range of conditions of weather, altitude, etc. The full data are tabulated in his paper "Tea in Relation to Food and Drug Regulations. I. Ash Contents" in the *Tea Quarterly* (Ceylon), vol. 14, 1941, pp. 110-113. In round figures he expresses his conclusions as follows: Total ash is not less than 4 per cent. and not more than 7 per cent. of the dry weight of tea. Soluble ash is not less than 2 per cent. and not more than 5 per cent. of the dry weight of tea. Expressed as a ratio to total ash, the soluble ash varies between 50 and 70 per cent. Teas grown at high elevations appear to have a lower ash content than those grown at low elevations. Average figures for ash percentage in Broken Orange Pekoe were lower than for Orange Pekoe, the total ash averaging 4·92 in the former and 5·50 in the latter, the corresponding figures for soluble ash being 3·06 and 3·51; the ratio of soluble to total ash being very constant at 61·6 and 64·0 respectively.

Orange-Carrot Juice

Canned carrot juice is reported to be increasingly popular in the U.S.A. It has the disadvantage of having to be sterilised at 240°F., which probably destroys much of its vitamin B_1. Moreover, it is not very rich in vitamin C. Several years ago W. V. Cruess found that a blend of orange and carrot juice, when canned, retained its flavour and aroma extremely well on storage, and he, with George Chong, gave some details of recent experimentation with the product in a recent issue of *The Canner.*

After more than one year's storage, the orange-carrot juice had retained its flavour. It is very easily pasteurised, the acidity being high enough to permit processing at fruit juice temperatures. It is probably rich in vitamin C, is rich in carotene and should retain practically all of its vitamin B_1, since it need be heated only to 180°-190° F.

A recent blend tested 10° Brix after canning and in *p*H value was 4·05. This *p*H is low enough to permit safe processing at 160°-212° F.; that is sufficiently acid in reaction to prevent growth of *Clostridium botulinum.*

According to the authors, the carrot juice intensifies the orange flavour and almost completely masks the stale flavour that is usually noticeable in canned orange juices several months after canning. They believe that the blend has very good commercial possibilities, as it is, in their estimation, much superior in beverage quality to any of the canned vegetable juices on the market.

Might it not be possible in this country to evolve a blend of carrot-apple juice, with or without the addition of ascorbic acid?

Studies of Rancidity of Fats and Oils

In a paper by Mayne R. Coe, published in the December, 1941, issue of *Oil and Soap* (U.S.A.), the author classifies the most important factors which affect the life of a fat or oil as found on the market today under two main heads: (*a*) the primary factors, such as metals and light; and (*b*) the contributory factors of air, moisture, temperature and photo-sensitisers.

The oxidation of oils, if due to the catalytic action of metals, may be explained, says the author, according to a recent theory of rancidification which implies that hydrogen peroxide (HO.OH) in the active state must be produced before this form of oxidation can take place. Following the discussion of the work of different investigators, the conclusion is reached that copper, being the most active catalyst for oxidation, should not be used for oils unless heavily tinned. Iron, although not so active in catalysing rancidity, should be replaced with tin or aluminium where possible. Because mere traces of such active metals suffice to produce oxidation, the kind of metal employed in the making of equipment to be used in connection with oils and fats should be given first consideration.

With regard to the effect of light, the author comes to the conclusion that when the intensity of light to which oil-bearing foods are exposed is the same, the ultra-violet, violet, and blue regions (below 4,900 Ångström units) promote rancidity the most, while the regions at about 5,400 and above 7,400 Angström units promote rancidity the least. The yellow region around 5,700 and the red region around 6,600 Ångström units are less active than the blue region, but nevertheless promote rancidity appreciably more than the green region.

The regions which are active in catalysing rancidity seem to correspond with the light absorption regions of the oils.

Vegetable Dehydration

That the dehydration of vegetables is going ahead by leaps and bounds in the United States is shown by the figures given in an article in the *Food Field Reporter*, March 2, 1942.

According to this article, six northern and central California firms are dehydrating a total of more than 200 tons of fresh vegetables daily, practically all of which output is going to America's armed forces or to allied nations under the Lease-Lend Act. Several of the firms are planning expanded operations and it is reported that new projects are contemplated. Vegetables now being dehydrated include cabbage, carrots, celery, potatoes, onions, tomatoes, spinach, green beans, beets, etc., and the finished product is in the form of slices or shreds, and, in the case of onions, powder. Recently a Quartermaster Corps survey of commercial facilities for increasing production of dehydrated fruits and vegetables was launched, the experts making the survey including Dr. S. C. Prescott and Dr. W. V. Cruess.

In view of this activity both in the United States and Canada it is somewhat puzzling to know what is keeping back similar operations in this country, except in such directions as potato and carrot drying.

The destruction of the vitamins, especially vitamin C, is an inevitable result of drying, although some commercial methods are claimed to retain a very satisfactory amount and experiments are continually being made to increase the retention.

The vitamin content of the food as it reaches the consumer should not only be considered. It is important that dehydrated vegetables be not required to be cooked for a time materially longer than fresh vegetables, otherwise a correspondingly larger loss of vitamins will ensue. If loss of vitamin C is one of the objections to the drying of vegetables there should be borne in mind the loss which is incurred between the time fresh vegetables are harvested and consumed in the ordinary way. The vegetable drier may well be in the position of the vegetable canner in that he is able to treat his raw material in the recently-harvested state, and thus partly compensate for losses incurred in processing.

Nor should the other virtues of vegetables be ignored—their protein and mineral content. Whichever way the matter is viewed in this country, the fact remains that no hesitation is evinced by the experts in other countries, including Germany, regarding the advisability of providing increasingly large quantities of dried vegetables as items of army rations.

Make It Snappy

An aspect of paper saving which may not have occurred to everybody has recently been ventilated. Firms all over the country are sending one another letters containing such space-wasting verbiage as: "Awaiting the favour of your esteemed reply, for which please accept our best thanks in anticipation." This sort of thing wastes paper, effort, and ink, and the Waste Paper Recovery Association in a letter says: "Cut it all out. Use smaller sheets of notepaper, write as briefly as possible, avoid long words and formal expressions."

It is perhaps with a tincture of shamefaced regret that we say good-bye to all those florid introductions and elegant endings merely because they are relics of halcyon days. Time and material are now "the essence of the contract", and we must emulate the methods of the registrar in the wild and woolly West where the marriage ceremony consisted of "Have him? Have her? Married", and apply to ourselves Ebenezer Scrooge's admonition to the ghost of his old friend and partner Marley, "Don't be flowery, Jacob!"

The Manufacture of Jam and Marmalade in Wartime

F. C. E. READ.

DURING the past few months certain difficulties have arisen in the process of jam manufacture which were not encountered in pre-war days. One of the problems has been unsatisfactory pulps due to the fact that in certain instances they have been prepared by unskilled labour. This is most noticeable in the case of the uncooked pulps, strawberry and blackberry.

Preservation of Fruit

Quantities of strawberries have been preserved on stalk and this pulp has to be cleaned by brushing through a fine sieve to remove stalks, leaves, etc., before use. The result is a smooth pulp which, except in a few instances, produces a dark-coloured jam of muddy appearance and is really suitable only for a mixed fruit jam such as strawberry and gooseberry. A good deal of the strawberry pulp prepared from plugged fruit was apparently put down without the addition of calcium bisulphite as preservative, and irrespective of the condition of the fruit. Thus casks of pulp which would normally be in excellent condition for use are now found, on examination, to contain a few whole berries while the rest of the fruit has broken down to a mush due to the fruit being over-ripe when preserved.

In the case of blackberries, these were often preserved cold without the addition of water, the only added liquid being the three pints of preservative solution per cwt. of fruit permitted under the Fruit Pulp Order, 1941. In some instances this method of preserving blackberries has led to trouble for the jam manufacturer. When the fruit is ripe the quantity of juice from the fruit is sufficient to allow the preservative solution to mix fairly well with the fruit when the cask is rolled (although this rolling rarely gives a really satisfactory mixing). If the berries are slightly under-ripe, however, very little liquid is present in the cask, even after the addition of the preservative solution. As a result the preservative does not easily reach the centre of the cask. The fruit which is thus improperly preserved will ferment to a greater or less extent, depending on the degree of mixing of preservative with fruit, and on arrival at the factory has to be cooked immediately and re-casked with the addition of extra preservative if it is to be stored safely. It is always advisable to cook and re-cask any pulp which is suspected of liability to fermentation.

Supplies of Pectin

The actual manufacture of jam has been affected, although not, perhaps, to a great extent, by the difficulties of obtaining supplies of pectin and by the reduction of the minimum fruit content of certain full fruit standard jams to 20 per cent.

Since a large part of our pectin has to be imported—mainly from America—it has become increasingly necessary to reduce the quantity used to a minimum. The jam should, however, have a good, firm set since the consumer makes his jar of jam last over a much longer period than in pre-rationing days. If this jam has a slack set, the broken surface which is exposed to the air will be more prone to " bleeding " and thus to fermentation or mould growth.

The two main factors affecting the strength of gel, and thus the quantity of pectin which must be added to the jam, are the *p*H value and the percentage of sugar present. The optimum *p*H value for the manufacture of jam is usually held to be about 3·1, and to adjust the *p*H value to this figure most jams need the addition of a little fruit acid. Exceptions include jams made from plums and blackcurrants. When the time of heating of the jam is 10 to 11 minutes, a *p*H value of about 3·1 has been found to be most suitable for the formation of a satisfactory proportion of invert sugar (*i.e.*, a content of 28 to 33 per cent. on the freshly prepared jam).

Effect of Sugar Content

The total sugar content of a jam has a marked effect on the strength of gel, and to reduce the added pectin to a minimum it is desirable to keep the sugar content as high as possible. In practice it is found that a jam with a sugar content higher than 69 per cent. will crystallise readily unless the invert sugar content is very carefully controlled. A total sugar content of 68 per cent. with an invert sugar content of 35 per cent. is satisfactory, and to boil jam safely to this figure it is necessary to keep a constant check on the boilings by means of the refractometer (a freshly prepared jam should give a reading of 71 to 72 per cent. total soluble solids). To ensure safe keeping properties, this jam should contain 30 to 40 per cent. invert sugar on analysis of the cold sample.

Much of the pectin now available is the powdered citrous pectin imported largely from America. The use of this pectin means additional work for the jam boiler since if it is added to the jam in powder form the resulting gel will be curdled, due to the difficulty with which the pectin is dissolved. It is essential to form a solution of this powder before it is added to the jam, and there are two satisfactory methods of dissolving the pectin.

Dissolving the Pectin

If sufficient 66 per cent. sugar syrup is available the better method is to disperse the powdered pectin in approximately five times its weight of syrup, so that a smooth paste is obtained, free from lumps, and then add boiling water with vigorous stirring. Alternatively, the pectin can be intimately mixed with approximately five times its weight of dry sugar, all the boiling water re-

quired added as rapidly as possible, and the mixture stirred vigorously until the pectin has dissolved. The drawback to this method is the fact that the pectin must be very thoroughly mixed with the sugar in the dry state, otherwise the resulting solution will contain small lumps of undissolved pectin, and the presence of these will result in considerable variations in the set of the finished jam.

It should be noted that the citrous pectin, under the same conditions of *p*H value and sugar concentration, sets rather more quickly than the apple pectin formerly more generally used.

Manufacture of Marmalade

Perhaps the most important factor affecting the manufacture of marmalade is the condition of the fruit on arrival at the factory. Whereas in pre-war days the fruit usually arrived in excellent condition, now, owing to delays in handling and in transport generally, the oranges often arrive bruised and over-ripe. Under such conditions it is impossible to produce a really first-class marmalade pulp, although much may be done to maintain the quality by changes in the process of manufacture, such as reduction of cooking time and less vigorous boiling.

Another big drawback is the lack of lemons, which are always a decided asset in the preparation of a good marmalade pulp, since the addition of lemon hearts helps to lower the *p*H value.

Quantities of grapefruit pulp are now available, but this pulp is sometimes of poor quality, with a low pectin and acid content, and with the skin present as a soft mush or irregular pieces rather than in the form of well-cut chips. Where a good grapefruit pulp is available, however, an excellent marmalade can be made either with this pulp alone, or with a mixture of grapefruit and bitter orange—the bitter flavour of the former blends well with that of the orange.

Recently sweet orange pulp has been imported into this country in some quantity, but in the experience of the author some of this pulp is not well suited for the manufacture of marmalade. A good quality pulp prepared from sweet oranges will produce a marmalade of fair flavour, although the set is usually poor since the *p*H value of the pulp appears to be rather high (3·4 to 3·8). The flavour of this sweet orange marmalade is delicate, lacking as it does the strong bitterness usually associated with marmalade, while the appearance compares unfavourably with that of the bitter orange product owing to the fact that the white pith of the skin remains opaque.

Packages

The introduction of jam and marmalade packed in cans, which has been brought about by the shortage of glass jars, has carried with it additional problems for the jam manufacturer.

Even in small cans, such as the 1-lb. size, the jam is liable to suffer from overheating with consequent darkening in colour and excessive rise in invert sugar content. To avoid this, the filled cans must be cooled as soon after filling as possible, either by inmersion in cold water or under a spray of cold water. This quick cooling will slow down the inversion of the cane sugar very rapidly and in the case of small cans the proportion of invert sugar to cane sugar will undergo only very slight change during cooling. In general, it is necessary to have the invert sugar content of a jam which is to be poured into cans 3 to 5 per cent. higher than in the case of a jam which is intended for a glass pack of similar size, the jam being examined immediately after pouring.

The fact that the cans are subjected to water cooling indicates the necessity for perfect closures, since a faulty seam may allow water to be drawn into the can with the possibility of subsequent fermentation or mould growth. A very slight defect in the adjustment of the seaming rolls of the closing machine may give rise to closures which, although actually faulty, appear perfect to superficial examination. To avoid such closures, a check must be kept on the closing machines by taking sample cans at frequent intervals during the day's run, and opening the seams, when the length of the hooks can be checked by measurement. Any faults in the seams are thus detected and can be corrected before they become really serious.

Filling Temperature

A point which has to be watched carefully is the filling temperature of the jam. In the event of a breakdown of the closing machine there is a tendency to leave the bulk of the jam in a container and then to carry on filling this jam when the closing machine is running again. In such cases the temperature of the jam is liable to drop considerably before the jam is filled. If the temperature falls much below 180° F. the jam should be put aside and mixed, a little at a time, with fresh boilings; since a filling temperature below 180° F. often gives a "crumbly" set on the finished pack. The filling at a low temperature may also result in failure to destroy all yeasts and moulds in the can, and these organisms may, under certain conditions, cause deterioration of the jam.

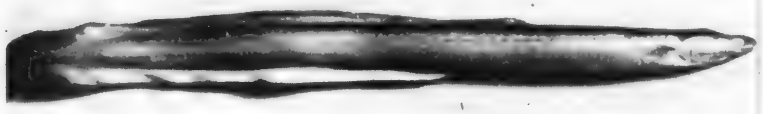
The use of a small label for cans is much more difficult than the labelling of glass, and presents an additional problem—that of rust spots beneath the label. It is also much more difficult to obtain satisfactory adhesion between the can and label. Fortunately this problem and that of rust spots can both be solved, if not completely, at least very largely, by the use of a band label.

Dehydrated Mutton

A SMALL consignment of dehydrated mutton that has been shipped to Great Britain from Australia has aroused a great deal of interest in meat circles. By this method it is claimed that it would be possible to increase by fifteen times the quantity of mutton now shipped in one boat to Britain and that the process would provide an outlet for very large numbers of sheep, and would be a solution of the ban now placed on f.a.q. mutton for export by the Australian authorities under the British meat contract.

The process reduces the mutton, after it has been boned, to one-sixth of its original weight. The product is in desiccated or dried form, and, for the purpose of the trial shipment, was packed in 4 lb. and 40 lb. lacquered cans.

The Common Eel



Its life history, food value and modern methods of preservation and canning

Part I

By ELLIOT B. DEWBERRY, M.R.I.P.H., M.R.San.I.

THE EUROPEAN fresh-water eel inhabits the rivers which enter the sea along the Atlantic coasts, as far south as the Canaries, South and West Ireland, the Baltic and the Mediterranean to the Black Sea.

Historical

Geologically, the eel family is a very ancient one. Fossilised remains have been discovered in the chalk. Cave drawings by prehistoric man point to the probability of the eel being caught and eaten in those remote times.

The genesis of the eel is more or less wrapped in mystery. 3,000 years ago Aristotle, the Greek naturalist, maintained that it had its origin in the mud, both in fresh and salt water. Pliny considered that small pieces of skin rubbed from the body on stones turned into small eels. Others maintained that they were spontaneously generated or developed from mud and slime or were the outcome of putrefaction—no soft or hard roes having been found in any of these fish.

The eel was held in high esteem by the Egyptians. Not only was it a valuable food; it was even included amongst their gods. The wives of the Greeks and Romans wore golden ornaments depicting this fish and designated it the "Helena" of their feasts or the Queen of palate pleasure.

In Ireland a superstition existed that eels were the descendants of serpents on which Saint Patrick served a writ of ejectment depriving them of any local habitation on land. Great prejudice existed against them in Scotland, probably owing to their likeness to a serpent; consequently they were associated with evil influences.

Izaac Walton (1653) remarked: "Eels growing old breed other eels out of the corruption of their own age, which exceeds not 10 years. As, also, worms are made of glutinous dew-drops which are condensed by the sun's heat, so eels are bred of a particular dew falling about May or June on the banks of ponds and rivers."

It may be of interest to mention that the Isle of Ely is said to have been so named from the rents formerly paid in eels to the Lords of the Manor, who were entitled to more than 100,000 of them annually.

General Characteristics

The colour of the fresh-water adult eel ordinarily varies from dark olive green to blackish on the back, golden yellowish white on the underside. It is commonly known as the "yellow eel" to distinguish it from the silvery or migratory eel. The body is elongated, barrel shaped (snake like) and very flexible; the skin smooth and slimy. The jaws (lower one the longer) are furnished with a band of small pointed teeth covered by thick fleshy lips; the eyes are small.

The eel has well-developed blunt pectoral fins, the dorsal, caudal and anal being united to form one long fin. These, and the rounded shape of the body, enable it to swim swiftly by graceful wriggling movements. The tail is flat and paddle-like with a broad spear-shaped tip which allows the eel to anchor in swift currents, leaving its head free to catch any prey within range.

Formerly the eel was regarded as scaleless, but in 1873 Baudelot discovered that in certain areas the surface of the skin, seen under the microscope, exhibited very fine oval scales at right angles to each other, but not overlapping. They are deeply embedded in the skin both above and below the lateral line. On the scales are well-defined rings, a new ring forming on the scale every summer when the fish feeds and grows.

This valuable characteristic enables the age of eels to be calculated just as the age of trees can be ascertained by the annual rings of growth visible in the wood. To obtain accurate results, however, all scales examined must be removed from the same part of the body, as some commence to grow later than others. No scales are present before the eel enters fresh water, and when it is about 7 inches (18 cm.) in length the first usually appear.

Habitat, Size and Food

The common eel abounds in streams, rivers, lakes, ponds, reservoirs, moats, etc. Some lakes and ponds are so inaccessible that one would hardly believe that the fish could gain access to them.

Most tenacious of life, it can sustain itself under

privation of air and food and withstand exposure to considerable cold. Very adaptable, it can live for some time out of water through being able to retain sufficient water to keep its gills moist. The water is stored in small cavities or chambers situated on each side of the head. The narrow external gill opening is the base of the pectoral fin. No other fish can survive so long out of water. Even when skinned and cut up the reflex action of the muscles causes the severed parts to move as if the fish were still alive.

There is a marked difference in the sex of eels as regards length and weight. The male rarely attains a greater length than 2 ft., but the female sometimes reaches a length of 4 to 5 ft., and may weigh up to 20 lb.; 1 lb. to 2 lb., however, is considered the average weight of an adult.

Until recently it was not possible to distinguish between the sex of eels, but Peterson, the Scandinavian naturalist, during his researches, was able to determine the males from the females by the incompletely formed roe or milt to be found in " silver " or migrating eels.

Adults are voracious and carnivorous and said to have cannibalistic habits. They usually carry out their depredations at night, and will devour almost any animal food living or dead. Their food consists chiefly of frogs, worms, insects, small fish, water rats, fresh-water shrimps, cray-fish and even newly hatched birds. Young eels feed on insects, worms, small fish and crustaceans.

It has been recorded that very large and powerful eels have at times been speared by herons. In some instances the eel, during the struggle, has coiled itself (in a strangle-hold) round the neck of the bird with such effect that fish and bird have died.

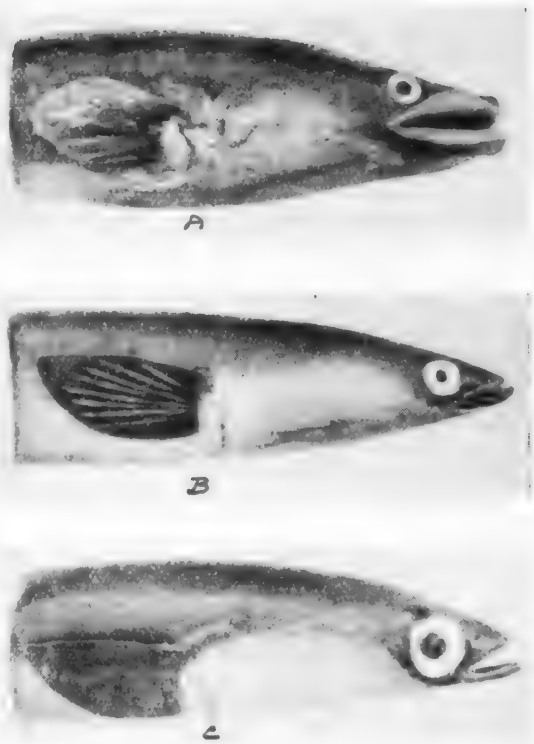
Eels Prefer Still Water

Eels prefer still water, though they inhabit slow-flowing streams and rivers. They seek the soft bottom, wriggling in and out of the mud, poking their dart-shaped heads into holes and crevices in search of food. In the daytime they hide in the mud or under large stones. They are influenced by meteorological conditions, being roused by thunderstorms and heavy rain (due, it is said, to the high degree of irritability of the muscular fibres, or changes in the atmospheric pressure) which causes them to rise in the water in search of worms and insects which may have been washed from the banks. In times of drought they remain in the mud until rain again brings them to the surface of the water.

Eels remain in the lakes and ponds, feeding and growing for many years, but if food becomes scarce they migrate overland to other waters. During the winter they retreat and bury themselves in the muddy river banks, sometimes to a considerable depth, and there remain in a torpid condition. From time to time they have been dug out from the banks in considerable numbers, and even unearthed by the plough far away from any water. Spring brings them once more into activity.

There is only one species of fresh-water eel in British waters. Until recent years—*i.e.*, before its life history was discovered—several varieties were described owing probably to its changing its colour and shape of head at the time of migrating.

Among the natural enemies of the fresh-water eel



Heads of adult European eels, showing changes that take place during migration.
A. Yellow eel. B. Silver eel. C. Mature eel.

are otters, polecats, water rats and large birds, such as herons and swans.

Life History

Fifty years ago the life history of the common eel was still more or less a mystery. The adult was known, however, to migrate every autumn from the lakes, ponds, etc., to the rivers and thence to the sea. In the spring thousands of small eels, about 2½ in. long, enter the rivers from the estuaries and make their way up stream. Naturally it was concluded that these young fish were the offspring of the adults which had descended to the sea in the autumn and that breeding took place somewhere near the coasts.

This theory, however, was found by subsequent investigations to be incorrect, as will be seen later.

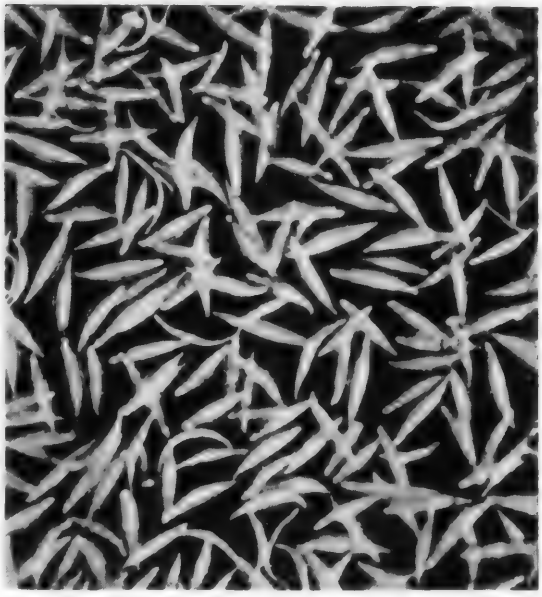
During the late summer or early autumn some of the yellow eels—*i.e.*, ordinary adults feeding and growing in the fresh water—change their colour (due to some extent upon age, food and geographical position) and assume the " silvery " breeding coat preparatory to undertaking the long journey to the spawning grounds. This change occurs in the male at a much earlier age (4½ years to 8½ years) than the female (8 to 15 years). The usual size of the sexes at 7 years is, females 2 ft., males 1 ft. 8 in. long.

At the time of migration the eel usually ceases to

feed. The eyes grow large, the lips become thinner and the snout more pointed. The pectoral fins become more pointed, and the yellowish-green colour of the fish changes to a metallic silvery sheen on the sides and black on the back. The flesh is very fat and firm. All these characteristics become accentuated as the time for breeding approaches. The alimentary tract shrinks and the reproductive organs commence to ripen.

The silver eel becomes restless (the migratory instinct is strong in these fish) and finally migration commences. Even those which abound in isolated lakes and ponds endeavour to make their way to the rivers, by night, wriggling their way across the wet grass or soil to the nearest ditch or watercourse and thence to the rivers, continuing their journey down stream to the estuaries and open sea from which they never return. In migration the male is said to precede the female.

The instinct in the young eel which caused it to search for fresh water now causes the adult to return to the salt water. This curious alteration in taste has been taken advantage of in certain coastal lakes in Denmark. A certain amount of salt water is let in, and as the eels congregate in trying to find an exit to the sea they are netted in large numbers.



Larvæ of European eel from the Western Atlantic.

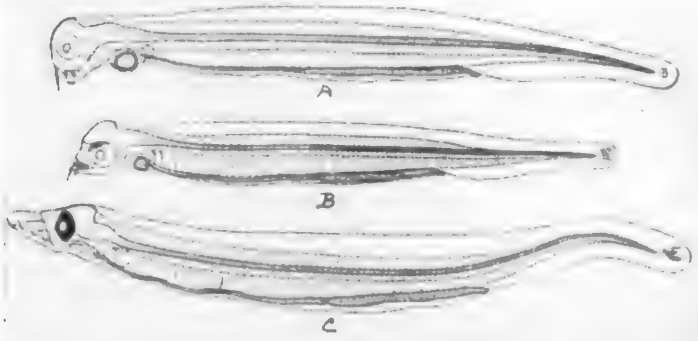
Migration

The actual time of migration, or running down stream, varies considerably in different parts of the British Isles, but ranges from July to November. The eels travel by day and rest by night. On the East Coast of England migration occurs during August and September; on the West Coast in October or November; in Ireland it sometimes commences as early as July. During these months large numbers of silver eels are caught in the rivers and estuaries by means of traps, nets, etc.

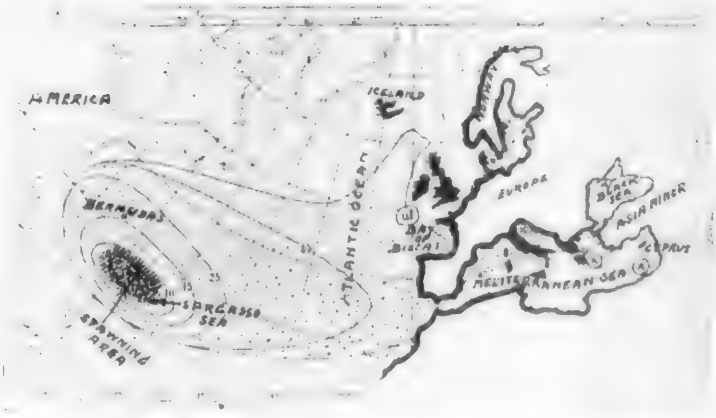
When the eels finally reach the open sea they are usually outside the range of observation, all proceeding in a westward direction. They swim in the depths of the ocean, consequently it is sometimes necessary for them to go some distance from the shore to reach the deep waters. Exceptions occur, however, in the Baltic Sea and around the shores of Denmark and Sweden, where large numbers are caught during the month of October on their way to the Atlantic, thus forming important fisheries in those places.

On the West Coast of Ireland a few specimens have been netted in the deep water from time to time by trawlers. In 1892 a female eel 29½ in. long was caught in the English Channel, and the ovaries on examination were found well developed. In this connection experiments have been carried out by catching and marking (silver disc or dorsal fin) numbers of silver eels, in the rivers, and then capturing them again during their western journey to the Baltic.

Research has proved that silver eels migrate across the Atlantic Ocean to their breeding ground in the Western Atlantic, south of Bermuda, where it is presumed they deposit their eggs in the ocean depths. How long the eel takes to perform this tremendous, arduous and adventurous journey,, approximating 4,000 miles, is unknown. Doubtless in this particular part of the Atlantic, favourable conditions exist (higher temperature and degree of salinity) for breeding and egg development. It is believed that silver eels spawn at a depth of 400 metres. After extrusion and fertilisa-



Prelarvæ from Sargasso Sea.
A and B. 6 mm. and 5 mm. long—with yolk sacs.
C. Young larva 7 mm. long.
(*After Schmidt.*)



Distribution of the European eel.

Distribution of larvæ in dotted area. Black strip along coasts where adults occur. The curves show limits of occurrence, i.e., larvæ less than 10 mm. have only been found inside the 10 mm. curve. The outermost curve denotes the limit of occurrence of unmetamorphosed larvae (ul).

The points marked x in the Baltic, the Adriatic and at the mouth of the Nile are the most remote places where elvers occur.

(*After Schmidt.*)

tion of the eggs both the male and female die from exhaustion.

Silver eels (usually males) have been caught from time to time in the Straits of Messina, off Sicily. These were very dark in colour, especially around the gills and pectoral fins, a feature common to fish which frequent the ocean depths.

Arrival of the Elvers

In the early months of the year enormous numbers of young eels, each about 2½ in. long, termed *elvers* (French—civilles), leave the sea and estuaries and seek the fresh water. They swarm up the rivers on the West Coast of the British Isles, and it has been recorded that the banks, particularly those of the River Severn, have been black with these small fish, which have the appearance and characteristics of adult eels.

In days gone by the name " Eel-fare " (Anglo-Saxon word signifying to pass or to travel) was given to this annual swarming of elvers up the Severn. Lyddaker records that, in 1886, 3 tons were captured in a single day in the Gloucester district. These young fish crawl up lock gates, damp walls and rocks and even block up water pipes—feeding and growing as they proceed. Travelling inland, they traverse the wet grass and find their way into the ditches and streams, finally reaching the ponds, lakes, reservoirs, etc., often many miles from the sea. In Switzerland they have been caught in waters at an altitude of 3,000 ft. above sea-level.

Bund, writing on the migrations in the lower Thame and Severn fisheries above Worcester, remarks : " The first that ascend the rivers are called elvers, they come in March and April ; then come a larger and darker form from 6 in. in length, called elver-boults. The next variety from 6 to 10 in. are termed putcheon eels. Eel 4 to 5 to the lb. go by the name of stick eels ; and if of ½ a lb. as shutlings ; all upwards of this weight as eels."

Eels often remain in fresh water for many years, growing into fat yellow adults, and until they have attained the appropriate stage of development. The migratory instinct causes some of them to change into silver eels. The duration of stay, however, varies according to sex, climate, etc., and ranges from 5 to 20 years or more. (Males 4½ to 8½ years, females 7½ to 15½ years.)

Early Life History

History relates that in 1763 a curious flat leaf-like colourless fish, with small dark eyes and about 2 in. long, was caught near Holyhead by William Morris. In 1788 it was described and named by Gmelin, *Leptocephalus Morrisii*.

During a gale in 1854 similar glass-like specimens were deposited on Pennan beach in Aberdeenshire, and in 1857 others were dredged up in 15 fathoms of water near Falmouth.

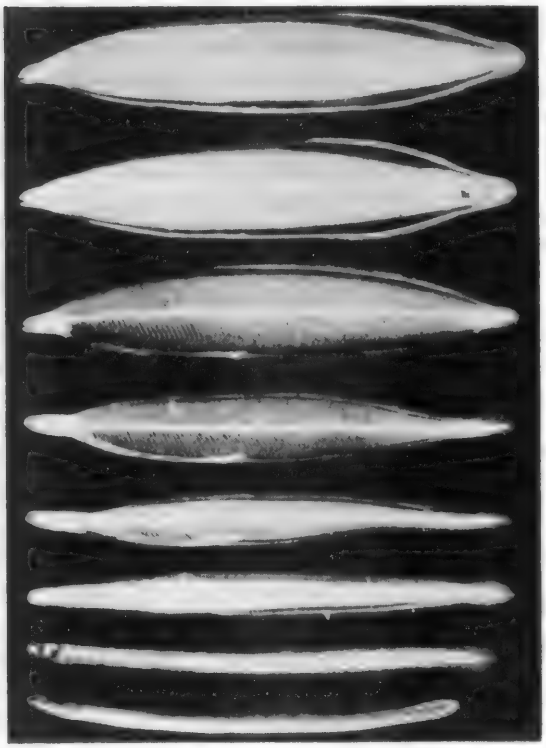
Kamp (1856) described a small transparent tape-like fish, which was obtained from the Straits of Messina It received the name of *Leptocephalus brevirostris*.

Gill (1864) expressed the view that these were the larvæ of eels, which afterwards proved to be correct. Roscoff (1890—Brittany) kept one of these larvæ in an aquarium and watched its transformation into a young eel.

The Italian naturalists Grassi and Calundruccio (1893) scientifically investigated the " eel question." They secured a number of small transparent leptocephali, each about 7 cm. in length, from the Straits of Messina, and watched their development and transformation into the larvæ of eels. They proved that *L. brevirostris* previously described by Kauf was that of the European fresh-water eel. These scientists concluded that the eels bred in deep water near the coast and the larvæ were brought to the surface in the Straits of Messina by strong currents. This was not the case, however, as was discovered later.

The question arose as to why larvæ were not found more frequently near the shores of Europe, but only in the waters around Southern Italy, and that those secured were not small newly hatched fry but fully grown larvæ.

Professor Johannes Schmidt (1904), the Danish naturalist, made further investigations and research into the life history of the eel. He confirmed the work of Grassi and Calundruccio, and later discovered large numbers of young eels off the West Coast of Ireland, during several expeditions sent out by the Danish Government. Schmidt searched for specimens from Iceland to the Bay of Biscay, and dredged thousands of miles of the sea with special apparatus and nets. After examining and measuring hundreds of the larvæ he found that the further west he proceeded the



Metamorphosis of larva into elver. Eight stages in the early life of an eel.

smaller they became. Schmidt concluded that the breeding grounds of the European eel were in a certain part of the Western Atlantic, south-east of Bermuda (Sargasso Sea), as this area was the only one where larvæ 5 to 7 mm. in length were captured.

Spawning

Spawning commences in the early spring and lasts into the summer.

Specimen of the egg of the European eel removed from the swollen ovaries of silver eels caught in the vicinity of the breeding grounds contained droplets of oil. It is recorded, however, that in 1927 an American expedition to the Atlantic procured 5 eggs, which hatched out into the American species of the eel (*Anguilla rostrata*).

The eggs of the European eel hatch out into myriads of tiny transparent fry (with yolk sac attached) which float in the sea (temperature about 20° C.) 200 to 300 metres (100 to 150 fathoms) from the surface. The small larvæ, which grow rapidly, are provided with curious needle-like teeth and feed on minute organisms. In their first summer they average about 25 mm. in length and begin to inhabit the upper layers of the sea (50 and 25 metres down), but are occasionally found on the surface.

Journey Across the Atlantic

By the north-eastern movement of the ocean they commence their journey to the European shores, being found during the first summer in the Western Atlantic (west of 50° W. long.).

While the Gulf Stream doubtless plays an important part in the transportation of the eel larvæ to the European coasts, there is also some evidence that they are influenced by a mysterious sense of direction, which urges them to travel east continuously.

By the second summer they attain an average length of 55 to 60 mm., and reach the middle of the Atlantic Ocean.

During the long and tedious journey the larvæ are attacked and eaten by many enemies—birds (particularly gulls), fish, including flying fish, mackerel, etc.

By the third summer they arrive off the Coast of Europe and are fully grown, but still retain their leaf-shaped form and average about 75 mm. (2 to 3 in.) in length. The larvæ are now a little over two years old.

Metamorphosis

During the subsequent autumn and winter they undergo a metamorphosis, which gives them their eel form. During this remarkable change the young fish cease to feed, the needle-like teeth are shed, the eyes become smaller, a considerable shrinkage takes place in both their length and depth, and their bodies become cylindrical. The growth of the dorsal and anal fins takes place and gradually new sets of small conical teeth are acquired. The young fish now arrive at the "elver" stage.

They move inshore, feeding upon plankton, jelly-fish, sea squirts, molluscs, small crustaceans and small fish. Some of the eels (principally the males) remain for a time in the estuaries and brackish lagoons. Others, mostly females, seek the fresh water and make their way up the rivers and water courses and finally penetrate inland.

The average age of the elver in the spring is about three years.

Such is the romantic life history of the European eel. The solving of this problem marked an epoch in deep sea exploration and economic oceanography.

Schmidt remarks: "No other instance is known among fishes of a species requiring a quarter of the circumference of the globe to complete its life history and larval migrations of such extent and duration as those of the eel are altogether unique in the animal kingdom."

(To be continued)

"Food Manufacture" 1941 Index

As it will not be possible to bind the January and February numbers of FOOD MANUFACTURE with the rest of the 1942 volume owing to the change of size starting with the March number, the index for 1941 will include the January and February numbers. It is suggested that those who wish to bind FOOD MANUFACTURE will include these numbers in the 1941 volume. Copies are now available to subscribers on receipt of a stamped addressed envelope, preferably of a size which will permit of the index to be sent without folding.

The Contamination of Foods by Poison Gases

Part II

By W. R. WOOLDRIDGE, Ph.D., M.Sc., M.R.C.V.S.

WHEREVER possible the detection of gases should be made by the Gas Identification Officer (G.I.O.), a civil defence officer, who is a properly trained chemist with specialised experience in war gases. It is an advantage where foods are concerned if the G.I.O. has some personal knowledge of food technology.

The Detection and Identification of War Gases

The gases may be detected by subjective or objective methods—that is to say, by their effect upon the senses of the human observer or by appropriate physical or chemical tests made directly upon the gas itself. Subjective methods are the ones usually adopted in the "field."

(1) SUBJECTIVE METHODS.—(*a*) The most important of these methods is detection by *sense of smell*. Most poison gases have distinctive smells which, whilst being readily perceptible, are relatively harmless in low concentrations. Thus the smell of mustard gas can be detected in concentrations as low as 1 in 20,000,000 and the geranium odour of crude lewisite is perceptible in even greater dilutions.

Untrained observers must, however, remember that the sense of smell varies considerably with individual idiosyncrasy and with previous training, that it may be affected by catarrhal or other infections of the respiratory tract and that it is a sense which tires readily. The following points should be remembered when trying to identify a substance by sense of smell:

(i) A slight sniff is all that is necessary; deep inhalation should be avoided.

(ii) Repeated smelling dulls the perception and, therefore, the observer should inhale only once.

(iii) After smelling, the observer should pause for reflection so that he may recall the smell.

(iv) After smelling and reflection, the observer should exhale strongly through the nose several times to remove all traces of the substance as far as possible. A new smell test should not be undertaken until the effects of the previous one have disappeared.

(v) Smoking or the eating of sweets must be avoided whilst smelling.

It is interesting to know that traces of phosgene affect the taste nerves so that tobacco smoke acquires a flat metallic taste (tobacco reaction).

(*b*) *Sense of Vision.*—This sense is particularly important in cases of persistent gases and occasionally with non-persistent gases; as, for example, with a concentrated cloud of chlorine, which has a yellow-green colour when dry or a whitish appearance if much moisture is present. Phosgene or diphosgene give whitish clouds under similar damp conditions but are colourless and invisible when dry. Arsenical smokes are white and opaque if sufficiently concentrated, but invisible when dilute. Although all unusual gases may not be poisonous it is as well to be suspicious of them at first in wartime. Occasionally visual effects are evidenced by the presence of rotted clothing, bleached vegetation, corroded metals and the appearance of the edge of a crater. Contamination by crude mustard gas gives rise to black stains on objects with a dry porous surface—*e.g.*, brickwork, as the liquid is rapidly absorbed leaving a dark oily stain. A similar effect is produced by the persistent lachrymators which are dark-coloured oils. It is sometimes helpful to examine the surface layers of suspected foodstuffs microscopically, for the presence of solid particles derived from smokes.

(*c*) *Physiological Effects.*—The effects of gases upon living organisms are useful in assisting detection, as, for example, with the lachrymators, which are immediately irritant to the eyes. Mustard gas has only a delayed action upon the skin, but lewisite is immediately irritant.

This delayed skin reaction is made use of by the Gas Contamination Officer to see whether a foodstuff which has been decontaminated and no longer obviously smells of mustard gas, is in fact free from this gas. A quantity of the treated material is held (by various techniques) against the forearm of an individual for a period of about ten minutes. If mustard gas is still present in the material a slight reddening of the skin at the place of contact develops by the next day and then the foodstuff must be considered unfit for release without further treatment.

In the absence of positive subjective indications of the presence of gas the suspected material may be cautiously tasted.

(2) OBJECTIVE METHODS.—(*a*) *Physical methods* have been used but they are not particularly serviceable.

The use of detector paint is helpful in the determination of areas contaminated with *liquid* blister gas. The detector is usually a suitable solid material painted with a special yellow-coloured paint, which turns red in contact with liquid gas. The reaction is not specific for blister gases as such substances as KSK, BBC, acetone, nitro-benzene, and pyridine also affect the paint. Furthermore, the use of these detectors is further limited by the fact that the reaction is given only by liquid and not by vapour contamination.

(*b*) *Chemical Analysis.*—A useful review of the methods adopted for the detection of war gases in foodstuffs has been published in the *Analyst*.[2] Definite information regarding the nature or type of gas contaminating a foodstuff can generally be obtained from:

(i) Examination of a sample by air-flow analysis, or

(ii) If subjective tests or air-flow analysis suggests the presence of a persistent lachrymator, extraction of a sample with alcohol and examination of the extract, or.

(iii) If the gas cannot be identified by these means then it will have to be analysed for the elements present, after preliminary concentration by extraction of the affected material with ether or by absorption of the gas upon charcoal.

The sample chosen for analysis should be taken from the material most heavily contaminated, *i.e.*, generally the surface layer of the food, but sometimes surface droplets may be absorbed by cotton wool or filter paper and this analysed.

(i) *Analysis by Air-flow Methods.*—A sample of the foodstuff of about 20 g. weight and in small pieces is placed in a large glass boiling-tube (2 in. diameter) with a well-fitting rubber bung carrying right-angled glass inlet and outlet tubes, the former reaching to within 2 cm. of the bottom of the boiling tube. The tube is immersed in a water bath at 37° C. and air, purified and dried by passage respectively through granular activated charcoal and anhydrous calcium chloride, is aspirated over the small pieces of contaminated foodstuff for 10 to 14 minutes at a rate of 0·1 to 0·5 litre per minute into 10 ml. of absorbent. The aspiration is carried out twice, using firstly water and secondly alcoholic potash as the absorbent; the resulting solutions, after warming and cooling, are examined on the lines indicated in tables I and II, confirmatory tests being applied subsequently.

TABLE I.

Examination of Aqueous Solution After Aspiration.

Filter, if necessary,* and test a portion of the filtrate with silver nitrate.	White precipitate of silver chloride.	Diphosgene, mustard gas, lewisite or other readily hydrolysable gases (see below) and adjuvants.
If a precipitate is obtained with silver nitrate, test other portions as follows:		
(*a*) Add a few drops of hydrogen sulphide water.	Turbidity.† Turbidity, soluble in excess.	Alkyl dichloroarsines. *Lewisite.*
(*b*) Add a drop of 1 per cent. phenol solution and run in carefully a layer of conc. sulphuric acid.	Red zone at interface (due to formaldehyde).	Chloromethyl chloroformate; halogen — substituted methyl ether.
(*c*) Add caustic soda and warm.	Ammonia evolved.	Cyanogen halide.
(*d*) Add barium chloride solution.	White precipitate of barium sulphate.‡	Chlorosulphonic acid or ester; sulphuryl chloride.
(*e*) Add lead acetate solution.	Black precipitate of lead sulphide.	Thiophosgene, perchloromethyl mercaptan.
(*f*) Reduce with zinc and hydrochloric acid.	Evolution of arsine.	Arsenic trichloride (lewisite, etc., may also give some arsine under these conditions).

* Precipitate may be a gelatinous hydroxide (from adjuvant such as $SnCl_4$, $TiCl_4$ or $SiCl_4$), diphenyl urea (from phenyl carbylamine chloride) or sulphur (from perchloromethyl mercaptan).

† Cyanogen chloride or bromide may give a precipitate of sulphur, and phenyl carbylamine chloride may give an oily suspension of phenyl isithiocyanate.

‡ A precipitate of barium sulphate without an accompanying chloride precipitate indicates sulphur trioxide or dimethyl sulphate.

TABLE II.

Examination of Alcoholic Potash Solution After Aspiration.

Warm and cool; in addition to indications as in Table I, test portions of the solution as under:		
(*a*) Acidify with nitric acid and add silver nitrate solution.	Pale yellow precipitate of silver bromide.	Bromine-containing lachrymator —*e.g.*, *B.B.C.*
(*b*) Acidify with acetic acid and test with Griess-Ilosvay nitrite reagent.	Red colour.	*Chloropicrin.*
(*c*) Acidify with hydrochloric acid and reduce with zinc.	Evolution of arsine.	*Lewisite*, primary dichloroarsines.

(ii) It should be noted that readily hydrolysable gases contaminating wet materials, the arsenical smokes, K.S.K., B.B.C., xylyl bromide and other relatively non-volatile gases may be missed by air-flow analysis. If contamination with an arsenical smoke is suspected, a sample of the superficial layers of the material should be destroyed with sulphuric and nitric acids and the arsenic present detected and determined by the usual analytical methods,[4] but if the gas present appears to be a non-volatile liquid lachrymator, a sample of the foodstuff should be extracted with hot absolute alcohol by maceration for several minutes and the extract examined according to Table III (see page 125).

(iii) *Examination by Determination of Elements.*—If the gas cannot be identified by the methods indicated in the previous sections, it will be necessary to characterise it on the basis of the elements which it contains. For this purpose the gas must first be removed from the contaminated foodstuff either by extraction with dry ether[5] or by volatilisation and concentration on activated charcoal granules.[6] In the latter method air, purified by passage over calcium chloride and activated charcoal, is aspirated over a small quantity of the sample in a glass vessel maintained at 50° C. by means of a water-bath, and then over activated charcoal at a rate of up to 0·5 litre per minute for a period of one hour. The activated charcoal should be in the form of small cylinders or granules, suitable portions of which are used in the tests for the elements.

Detection of Halogen.—(*a*) For small quantities of gas, say 2 mg., use Beilstein's method as modified by Dijkstra;[6] a piece of copper oxide is fastened on the end of a copper wire. The oxide is moistened with alcohol and heated to glowing in the oxidising flame of a gas burner. This is repeated until the flame is no longer green. A cylinder or granule of the activated carbon in which the gas has been absorbed is then

placed in a tube bent at right angles at the end, the tube is heated and air is blown through so that it impinges upon the glowing copper oxide in the flame. The heat of the flame will drive the absorbed gas from the carbon, and should it contain halogen the flame will become tinged with green. A modified Beilstein test has been suggested by Hayman.[7]

(*b*) For larger quantities of gas: (i) Studinger's method.[8] One drop of a concentrated ethereal extract or a suitable portion of the carbon-gas adsorbate is boiled with 0·5 ml. of a 2/N solution of sodium hydroxide in methyl alcohol. The liquid is decanted from the carbon (if this has been used) and the mixture is acidified with 10 per cent. nitric acid, and silver nitrate solution (5 per cent.) is added. If halogens are present a precipitate will be obtained.

(ii) For aromatic chloroarsines, Pringscheim's method is preferable. One or two drops of the concentrated ethereal extract is added to, or the carbon-gas adsorbate is mixed with, 0·2 g. of anhydrous sodium carbonate and 0·2 g. of sodium peroxide in a nickel crucible. The crucible is covered with a lid and the mass is ignited with a glowing nickel wire. The residue is dissolved in water, filtered, and half of the filtrate is acidified with nitric acid (10 per cent.) and tested with silver nitrate solution (5 per cent.) for chloride, bromide and iodide, and with barium nitrate solution (5 per cent.) for sulphate. (The other half should be acidified with arsenic-free sulphuric acid, pure zinc added, and the Gutzeit test for arsenic applied.)

Detection of Nitrogen—(*a*) *Micro-method.*—The carbon containing the gas is heated in a tube in order to oxidise it, and the oxidised gas is blown out into a drop of conc. sulphuric acid in a small tube. A crystal of diphenylamine is added. If nitrogen is present a blue colour results on adding hydrochloric acid. A blank test should be carried out, as the reaction occurs with various oxidising agents and is not specific for nitrates. Alternatively, a little ferrous sulphate is added to the acid solution. A brown colour indicates the presence of nitrogen peroxide. This reaction is not as sensitive as the previous one, but is more specific.

(*b*) *Macro-method (Test for Cyanide).*—Two drops of the concentrated ethereal extract of the sample or the carbon-gas adsorbate are heated in a small tube with sodium and plunged into 3 ml. of water. One-half of the filtered solution is heated with a small crystal of ferrous sulphate and acidified with hydrochloric acid. A Prussian blue colour indicates nitrogen (cyanide). The remaining half of the solution is used for testing for sulphur (see below).

The cyanide may also be detected by means of benzidine copper acetate paper.[9] 2-3 g. of pure benzidine acetate are heated to 80° C. in 100 ml. of distilled water for 10 to 15 minutes, with constant shaking. When cold, the mixture is filtered by suction; the filtrate then contains approximately 1 per cent. of benzidine acetate. 3 g. of cupric acetate (A.R.) are dissolved in 100 ml. of water. Immediately before the test is made 25 ml. of the benzidine acetate solution and 2 ml. of cupric acetate solution are mixed and stirred well. The test-papers are dipped in this mixed solution, allowed to drain, and then dried until only just moist. They may be held above the liquid in the tube containing the acidified solution under test. If cyanide is present they will turn blue, thus indicating the presence of nitrogen.

If an ethereal extract is used, a blank test should also be carried out on material known to be uncontaminated, in case soluble nitrogen compounds are present in foodstuff itself. It is assumed that sufficient carbon will be present in the extract to give the cyanide reaction. Cyanide may itself be present in the gas, and direct test on air drawn over the foodstuff may, therefore, be employed in addition.

Detection of Sulphur—(*a*) *Micro-method.*—Activated carbon containing the adsorbed gas is moistened with caustic soda solution and heated with sodium in a small combustion tube. After ignition the tube is broken into a little water placed on a silver coin. If sulphide is present a stain of black silver sulphide will be obtained. A blank test should be carried out on the uncontaminated food.

(*b*) *Macro-method.*—The remaining half of the filtered solution obtained in testing for nitrogen by the macro-method is used for this test. Two drops of a

TABLE III.

EXAMINATION OF ALCOHOLIC EXTRACT FOR PERSISTENT LACHRYMATORS.

Add alcoholic potash and warm to effect hydrolysis.	Intense red colour and formation of resinous products.	Chloro- or bromo-acetone.
Filter, if necessary, and test portions of the filtrate as follows:		
(*a*) Acidify and test as in Table I for halogen, etc.	(See Table I)	
(*b*) Boil.	Evolution of ammonia.	*B.B.C.*, cyanogen halide.
(*c*) Remove alcohol and oxidise residue with alkaline permanganate.	Formation of benzoic acid.	*Benzyl bromide, B.B.C., C.A.P.*
	Formation of phthalic acid.	*Xylyl bromide.*
(*d*) Acidify with acetic acid and test for glycollic acid.	Positive.	*Ethyl iodo-* or *bromo-acetate.*
If the original alcoholic extract contains an appreciable amount of gas, add 20 per cent. aqueous alcoholic sodium sulphide, warm, if necessary, to effect reaction, cool, dilute with water, filter off precipitated sulphide and determine its m.p.*	22′-Diketo dipropyl sulphide (m.p. 47° C.).	Chloro- or bromo-acetone.
	Dibenzyl sulphide (m.p. 49° C.).	*Benzyl bromide.*
	22′-Diketo 33′ diphenyl diethyl sulphide (m.p. 77° C.).	*C.A.P.*
	Dithian (m.p. 111° C.).	*Mustard gas. B.B.C.*
	αα′-Dicyano dibenzyl sulphide (m.p. 150° C.).	

* *Xylyl bromide* gives a mixture of products, *ethyl iodoacetate* an oily sulphide (b.p. 267° C.), *lewisite* and other arsenicals the corresponding sulphides, and *chloropicrin* gives sulphur and tar.

NOTE.—The alcohol extracts may contain hydrolysis products of gases and adjuvants. Alcoholic extraction will not, in general, remove the decomposition products of smoke-producing agents, and, if the presence of the latter is suspected, extracted residue should be boiled with alkali and the filtered solution tested in the usual way for tin, silicon, titanium, etc.

solution of sodium nitroprusside are added. A violet colour indicates sulphide. A blank test is necessary.

Detection of Arsenic.—A direct Gutzeit test should first of all be carried out on the sample itself. If a negative result is obtained the sample should be destroyed with sulphuric acid and the Gutzeit test carried out by the S.P.A. method.[4] Helpful modifications of the method have been described for arsenic[9] and for lewisite.[10]

Grouping of War Gases

On the basis of the elements present, but ignoring carbon, hydrogen, or oxygen, the war gases can be divided into five groups as under.

The gases most likely to be encountered in war are italicised, whilst those which will rarely be met with in samples of contaminated foodstuffs, on account of their volatile or particular nature, are enclosed in parentheses.

I. *Halogen only.*—(Chlorine), (*Phosgene*), *Diphosgene*, Benzyl and Xylyl bromides, Bromoacetone, (*Chloroacetophenone*), *Ethyl iodoacetate*, Chloromethyl chloroformate, Dichloromethyl ether.

II. (*a*) *Sulphur only.*—(Hydrogen sulphide), Dimethyl sulphate. (*b*) *Sulphur and Halogen—Mustard Gas*, Thiophosgene, Perchloromethyl mercaptan, Chlorosulphonic acid and esters, Sulphuryl chloride.

III. (*a*) *Nitrogen only.*—(Hydrocyanic acid). (*b*) *Nitrogen and Halogen—Chloropicrin, Bromobenzyl cyanide*, Phenyl carbylamine chloride, Cyanogen halides.

IV. (*a*) *Arsenic only.*—(Arsine). (*b*) *Arsenic and Halogen.—Lewisite, Methyl and Ethyl dichloroarsines*, (*Diphenyl chloroarsines*), Arsenic trichloride.

V. *Arsenic, Halogen and/or Nitrogen.—Diphenyl cyanoarsine*), (*Diphenylamine chloroarsine*).

Based on this preliminary grouping, confirmatory tests should be applied to identify the particular gas present. The possibility that misleading indications may be obtained if gases are present in admixture or dissolved in a halogenated solvent must, however, be borne in mind.

REFERENCES

1. "Food and its Protection against Poison Gas." (2nd edition.) 1941. Published on behalf of the Ministry of Food by H.M. Stationery Office.
2. "The Detection and Identification of War Gases: Notes for the use of Gas Identification Officers." His Majesty's Stationery Office, 1939.
3. The Detection of War Gases in Foodstuffs. W. J. Stainsby and A. McM. Taylor. *Analyst*, 1941, **66**, 44-54.
4. Report of the Metallic Impurities Sub-Committee. *Analyst*, 1930, **55**, 102.
5. J. Studinger (translation). *Chem. and Ind.*, 1937, **56**, 225.
6. D. W. Dijkstra, *Chem. Weekblad*, 1937, **34**, 351.
7. D. F. Hayman, *Ind. Eng. Chem., Anal. Ed.*, 1939, **21**, 470.
8. D.S.I.R. Methods for the Detection of Toxic Gases in Industry. *Leaflet No. 2—Hydrogen cyanide vapour.* H.M. Stationery Office. *Analyst*, 1938, **63**, 658.
9. The Determination of Arsenic in Foods contaminated by War Gases. H. A. Williams. *Analyst*, 1941, **66**, 228.
10. The Rapid Determination of Arsenic in Foodstuffs contaminated by Lewisite. W. J. Stainsby and A. McM. Taylor. *Analyst*, 1941, **66**, 233.

Potatoes for Chip Making

SPECIALLY CONTRIBUTED.

AS IS WELL known to those engaged in the chip potato trade there are standards for the colour of the final product, and, although these standards may be no better defined than by saying the chip or crisp shall be of "a rich brown colour", yet a retailer or manufacturer of "crisps" will be able to say instantly whether a sample of any batch is too dark or too light in colour.

In America F. E. Denny and C. Thornton published some time ago (Contrib. *Boyce-Thompson Inst.*, 1940, **11**, 291) the results of their examination of various tubers kept in cold storage when used for chip making. They judged the colour of the chips visually and had the advice of many retailers and those engaged in the trade to assist them in their assessment of what is regarded as a "good colour" in chips. Although the varieties of potato tubers examined by these workers may not be used, or grown, over here yet a number of their conclusions and observations are of direct value to the trade in this country and a brief examination of their conclusions is interesting.

Sampling and Analysis

In their first paper (*vide supra*) they gave full details of the methods of sampling, and analysis, which they employed in this work. They came to the conclusion that the brown colour developed by the potato in the process of chip making was due to the content of reducing sugar. They estimated the sucrose present and also the reducing sugars, and found that neither the value of the total sugars present nor the amount of sucrose gave any indication of the behaviour of any sample of tubers when submitted to the chip-making process. The amount of reducing sugar, however, provided a very valuable index of this behaviour.

Their method of making the chips was to take two slices from each tuber in a given sample, making into chips and cooking the chips (as a composite batch for that sample) in lard at 195° C. The amount of sucrose and reducing sugar present in the juice was determined on the remaining tissue.

The interesting results obtained in 1939 were followed up by these workers in 1940, and, in addition to confirming previous results, they have noted a number of new and interesting facts. They had available twenty-five different varieties of potato tubers of which the history from the time of harvesting to the end of the storage period was known in great detail. Batches of each variety were stored at 5°, 7° and 8·2° C. for varying lengths of time at each temperature and with other batches the storage was started at two different

intervals after lifting. One series commenced its cold-storage life on October 25, and another series, lifted at the same time, was put into cold storage on December 24.

Effect of Reducing Sugars

In all these series Denny and Thornton (Contrib. *Boyce-Thompson Inst.*, 1941, **12**, 217) confirmed their earlier observations that the concentration of the reducing sugars and not the amount of sucrose determined the colour of the chips produced from the tubers. It was found that if the amount of reducing sugars was in excess of 5·0 mg. per c.c. of juice the chips had too dark a colour to satisfy the demands of the chip-making trade. Those tubers containing about 5·0 mg. of reducing sugars per c.c. of juice gave chips of a satisfactary colour, and probably the optimum content of reducing sugar would be in the neighbourhood of 3·0 mg. per c.c. of juice.

Of the twenty-five varieties they examined, eleven of the previous year were repeated, and of these nine showed practically the same response to the various conditions even to the extent of giving the same number of milligrams of reducing sugars per cubic centimetre of juice. The other two varieties showed differences in behaviour from that previously experienced. When stored at 7° C. the tubers contained only 35 per cent. of amounts of reducing sugars contained in the juice of tubers stored at 5° C., whilst the reducing sugar content of those stored at 8·2° C. was only 16 per cent. of that contained in the latter.

Rate of Production of Reducing Sugars

When there was some delay in getting the tubers into cold storage at 5° C., the rate at which the reducing sugars were produced was retarded, and the value it reached after a period of cold storage—*e.g.*, 90 days—was lower than when the tubers were harvested and stored soon after. When stored at 7° C. many of the varieties examined maintained a lower reducing sugar content for periods of 108 to 131 days after the storage had started, and this temperature would, therefore, appear to be a favourable one for the storage of chips intended for potato chip manufacture. When stored at 8·2° C. the reducing sugar content was maintained at an even lower level than when stored at 7° C., but at 8·2° C. the amount of sprouting was much more extensive, and therefore this storage temperature is not so advantageous from the chip-making point of view.

Rural Group Varieties

The varieties of the rural group examined were outstanding in their maintenance of low values for reducing sugars, and Denny and Thornton examined some eight varieties of this group. Blue Victor and Chippewa varieties, although not belonging to the rural group, also showed a low content of reducing sugars. The tubers of the last-named variety, however, were found to sprout readily and finally to become too soft for the manufacture of chips. If the series are listed in order of varieties with regard to reducing sugar Irish Cobbler is the next on the list, but the suitability for chip manufacture of this variety would appear to be dependent on the time elapsing between lifting the tubers and putting them into cold storage. It was found, for example, that when the storage was a month or so the sprouting was satisfactorily checked for at least 108 days when stored at 7° C. The accumulation of reducing sugars was also maintained at a satisfactorily low level so that chips could be produced from these tubers, which were comparable, from the colour point of view, to those produced from tubers of the rural group. A number of varieties were found to produce too much reducing sugar under all conditions, and were therefore of undesirable quality for the production of chips, the colour developed on cooking, being a very dark brown.

It is important to note that, as mentioned above, a number of varieties gave practically identical results two years running, and further it has been noted that tubers of the same variety if grown in two different localities respond in the same manner to similar storage conditions. Even on different soils, and when the ground has been treated with different fertilisers this holds true and simplifies greatly any problem of alternative supplies of potatoes which might arise, from various causes, to worry the large-scale chip producer.

Storage Conditions

The storage conditions require to be rigidly standardised and observed as it was found that a temperature difference of only 1° C. was quite sufficient to bring about significant changes in the amount of reducing sugars and sucrose present.

With regard to the sucrose content under different conditions of storage, this was found to change, but the differences in amount present between those stored at 5° C. and those at 7° C. and between those stored at 7° C. and at 8·2° C. were much smaller than the changes in the amounts of reducing sugars at the corresponding changes in temperature, and it is the latter which is of interest from the chip manufacturers' point of view. Of minor interest is the fact that the order of the varieties for increasing amounts of sucrose is not the same as the order when they are arranged for increasing amounts of reducing sugars.

Although this work has been carried out on American varieties of potato tuber it is not too much to expect that similar results would be obtained if English varieties were examined. The method of checking the tendency to colour should be of value to large-scale manufacturers of chips and potato crisps in this country and add another powerful auxiliary method to those already in the scientific armaments of the trade.

Recovering Tin from Cans

One of the encouraging signs of the times is the possibility of recovering tin and steel from used tin cans. Preliminary studies suggest the recovery of 10,000 tons per year of secondary tin from this source. As an economic proposition, however, it cannot stand on its own feet. A Government subsidy will be required. More can be expected on this subject in future months, says *Food Industries* (U.S.A.).

The National Bread

From Sir Ernest Graham-Little, M.D., F.R.C.P., M.P.

To the Editor of "Food Manufacture"

SIR,—At a Press Conference with the trade on March 24, 1942, the Minister of Food declared his intention of adding calcium in the form of chalk to the "National Bread"—the name under which he wishes his new loaf to be known. In the food debate of July 18, 1940, the Ministry of Food announced its intention of adding synthetic vitamin B_1 and an unnamed calcium salt to the white flour, which constituted 95 per cent. of the whole yield. This "fortification", as it was euphemistically named by its begetters, was considered very fully at a meeting of eminent biochemists, whose opinions were also reported in your journal (September, 1940, p. 220). There was a qualified assent to the addition of the synthetic vitamin B_1, but almost unanimous opposition to the addition of calcium in the form of chalk. The general sense of the speakers was excellently summarised in the contribution made by Dr. Kent-Jones on "Fortified White Bread": "Vitamin B_1 is a natural constituent of the grain, and modern milling methods largely eliminate it. Its replacement therefore in the white flour is a logical step. . . . The situation with respect to calcium is quite different from that of the addition of vitamin B_1, and many will regard with considerable misgivings this proposal to turn white flour into a mild patent medicine. If it is necessary to add calcium to the diet it may later be thought equally necessary to add other elements."

The proposal to add calcium to flour apparently originated with a very tentative recommendation in a memorandum of the Medical Research Council, produced in May, 1940, and communicated to the Government before the debate of July 18. It ran as follows: "The public would be benefited by the addition of calcium salts to the flour from which bread is made. *Bread made from flour thus supplemented should be specially designated.*" The clause I have italicised expressly leaves the public free to reject this "doctored" loaf, but this freedom vanishes with the institution of the compulsory calcified product. At a trade conference with the Minister of Food on March 24, 1942, speakers drew the attention of the Minister to the fact that the lime content of drinking water varied enormously in different localities, and that consequently some sections of the population would receive too much calcium from this double supply, but the Minister refused to consider the suggestion that the quantity of chalk added to bread should be varied to meet these differences.

The reaction of the medical profession to the original proposal was as hostile as that of the chemists recorded in your report, and this combined opposition was brought to the attention of Parliament (*Hansard*, January 23, 1941), and perhaps as a consequence the proposal to add calcium to white flour, promised in July, 1940, was never carried out, although the addition of synthetic vitamin B_1 was adopted and partially effected. This experiment has now been finally abandoned; its financial cost to the country has been so considerable that the Minister of Food jibs at divulging it. (See question and answer here appended.)

The present revival of the calcium half of the original scheme, and now as a compulsory measure, is wholly unexpected, and a weighty protest against it is made in a letter to *The Times* of to-day from Dr. Harris, Director of the Research Institute, Liverpool, who points out that "calcium interferes with kidney function and the considerable number of middle-aged people whose kidneys show weaknesses are bound to suffer from an excess intake of this substance." In this view he is supported by the principal scientific adviser to the Ministry of Food, Professor Drummond, as quoted in your report of 1940, and in these circumstances the Minister's decision is utterly inexplicable. On general principles it is surely axiomatic that a foodstuff consumed in such variable quantities as bread is an unsuitable, and indeed unsafe, vehicle for irresponsible, compulsory and undisclosed medication in an experiment upon forty million people.

I am, etc.,
E. GRAHAM-LITTLE.

HOUSE OF COMMONS,
April 6, 1942.

QUESTIONS

Ministry of Food, Thursday, March 26, 1942.

"Sir E. Graham-Little. To ask the Parliamentary Secretary to the Ministry of Food whether he will give an estimate of the expenditure incurred up to date in promoting the fortified white loaf announced in July, 1940, including the cost of provision of factories in this country for the manufacture of synthetic vitamin B_1 and of the supply furnished in Canada and in the United States of America; the payment of royalties in respect of patents for production of their artificial vitamin and for bleaching the flour respectively, and the sums payable by way of compensation to the firms in this country and in Canada whose contracts will cease with the cessation of the milling of white flour.

"Major Lloyd George. I regret that I am not able to supply the estimate asked for by my hon. friend."

Prices of Flour

THE Minister of Food has made the Flour and Flour Mixtures (Current Prices) Order, 1942, which imposes a "standstill" upon the prices at which all types of flour and flour mixture may be sold; the prices must not exceed those at which similar grades were sold by the seller on January 31, 1942.

The Order does not apply to sales by flour millers, importers or licensed factors for which fixed prices are prescribed in the Flour (Control and Prices) Order, 1941, nor does it vary any conditions of a licence issued in respect of a flour mixture under the Food Substitutes (Control) Order, 1941. Flour mixtures are defined in the Flour and Flour Mixtures (Licensing and Control) Order, 1942, and the standstill now applied is the first step towards maximum price control of these substances. As a result of this Order the Flour (Maximum Retail Prices) Order, 1941, is revoked.

Refrigeration Engineering in Emergency Cold Stores

FORTUNATELY for the nation's well-being—now that we are at war, and food has become one of our most important munitions—it is possible to take full advantage of the phenomenal advance which has occurred in the science of refrigeration engineering.

For the advance which has been made in the development of cold-storage methods, we are greatly indebted to those who by their initiative and business acumen developed refrigeration plant and methods during times of peace when such matters had only a commercial interest.

To facilitate the bringing of food in good condition to our shores, the services of refrigeration engineers played an important rôle, for marine refrigerating plant was installed in British and foreign ships of such efficiency and high-grade quality that its reliability and economy gained for it the outstanding regard of shipbuilders and marine engineers.

Meanwhile storage on land was greatly improved by the collaboration of refrigeration plant manufacturers, one of whom used their fifty years of experience in ice-making and refrigerating plant to such an extent that they built and operated public cold stores in a number of widely separated areas, thus providing the food industries with a comprehensive system of well-equipped and carefully regulated cold stores, which furnished an opportunity of testing new developments of machinery and equipment design on a practical and commercial basis.

Government Cold Stores

It was therefore a natural sequence for Governmental authorities to turn to our most outstanding refrigeration engineering firms, when plans were being discussed for the building of new national emergency cold storage centres in which to preserve stocks of food assembled to meet both daily requirements and the emergencies arising from abnormal war conditions.

As the Government plans called for the creation of over a hundred of these cold stores, it naturally follows that all of the better-known firms of refrigerating engineers have for some time been heavily engaged in meeting these emergency requirements, this necessitating practically the whole of their respective plants, technicians, and organisations being concentrated on these wartime demands. Nevertheless, so well has the industry been developed that in addition to the requirements of the Government it is still able to carry out work in connection with food storage and refrigeration for industrial firms whose premises are being enlarged or converted in order to assist in meeting the national storage requirements or war demands.

Original Schemes

It was the British Association of Refrigeration who at their luncheon in January, 1940, laid before the industry certain detailed and definite plans for the pro-

One of the 50,000 cu. ft. cooling rooms of a Cold Store equipped with Refrigeration Plant by Messrs. L. Sterne and Co., Ltd.

vision of additional cold storage accommodation, and it is to the credit of all concerned that not only did the Cold Storage Section of the Ministry of Food authorise the original scheme, but also agreed to further schemes which more than doubled the augmentation originally planned.

As the result of this collaboration between Government departments and the refrigeration engineering industry a great number of these cold stores have already been erected by the Ministry of Works for the Ministry of Food, while others are in course of completion.

The sites of these emergency food centres have been carefully selected, so that the stocks of food are assembled in the less vulnerable districts, on sites so situated as to reduce distribution transport to a minimum.

Construction of Buildings

In construction, the plan generally adopted is that of a steel-framed structure carried on piled foundations with pre-cast floors and roof. All surrounding walls are of brick, which, however, are not weight carrying.

Following experience gained by cold-storage experts, concrete floors with a hard granolithic surface are now laid in cold-store chambers and all around a cold store. Such floors are easily kept clean and offer the easiest and best trucking surface.

The extent of these food-preserving centres may be gauged by the fact that most of the cold rooms have a capacity of 50,000 cu. ft., while the total capacity of the store varies from 250,000 to over 1,000,000 cu. ft.

While larger stores may be of a special design, a typical cold store is one of several storeys, the individual floors being arranged in such a manner as to afford rapidity of reception, storage and release, this by making the maximum distance from any part of the stowage area less than 100 ft. from the lifts, which are easily accessible from both banks. In many cases railway sidings have been arranged so as to serve both sides of the building without interruption.

Units are Self-Contained

Of special interest is the fact that these cold stores are being constructed in separate units of similar design and equipment. Each unit is self-contained with its own compressor and cooling rooms. This division into sections is equally applied to machinery, the installation of which, in some cases, is so arranged that one of the engine rooms is fitted with two compressors, one of which, as a standby, is intended to serve either of the units which, although quite separate and independent, are interconnected on each floor.

It would therefore require a very heavy raid—concentrated upon a single area—to do such damage as would affect the whole of a cold store.

The general design of these cold stores provides that on the ground floor there are only two cold rooms, one at each end of the building, so as to allow ample space for the handling of goods, which in the case of perishable foods arrive in insulated railway vans.

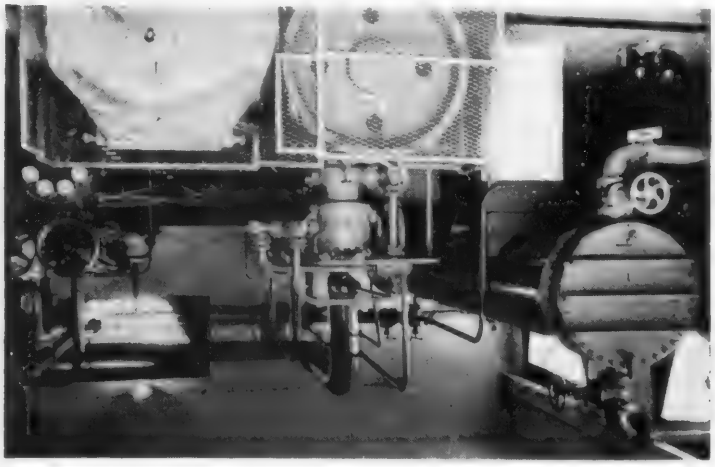
Loading banks conveniently arranged at tailboard level extend the full length of the building on each side, thus enabling goods to be entered into the building from the railway vans on one side, while deliveries can be made on the other side without interruption or track crossing.

To facilitate the speedy checking of entries and deliveries, weighing machines with platforms 4 ft. square are fitted in the goods handling space.

Electrical Supply

Thanks to the practical economies effected by the use of electricity, the primitive methods of food preservation and cold storage have now been replaced by modern plant which make it possible to maintain any desired temperature either continuously or for a given period.

Electric current is usually supplied from a transformer and sub-station situated some distance away from the building to avoid damage in the event of aerial attack, while the lay-out of the electrical supply is so arranged that current for both power and lighting can be taken from either engine room (one at each end of building) while, if found necessary, the load can be divided. About 600 kW. is the maximum power demand of these cold stores, to furnish with a 400 V. three phase, 50 cycle, A.C. supply is required. From the power house cables in parallel connect up with the main switchboards in annexes to the engine rooms, for



An engine room in a 500,000 cu. ft. Cold Store equipped by the Lightfoot Refrigeration Co., Ltd. Illustration shows two Lightfoot 4-cylinder ammonia compressors, each driven by 120-h.p. Crompton Parkinson auto-synchronous motors.

the supply of power and also the necessary current for the lighting and heating of offices, etc.

The Engine Rooms

Each engine room has a complete installation capable of maintaining the temperature of the whole of the rooms at the normal 14° to 15° F., while a reduction to 0° F. can be effected whenever necessary.

Here are housed the refrigerating compressors, generally two in each engine room, the largest stores having three compressors. With the exception of a few cases where horizontal ammonia compressors have been utilised, the dry compression system has been used with flooded type evaporators. In some cases the liquid ammonia is circulated through the coolers by ammonia pumps and in others natural circulation with surge drums is employed. Rectifiers and non-condensible gas purgers are fitted, as well as automatic high-pressure cut-outs on each compressor.

The cylinders average 7 in. in bore with a 6-in. stroke, and operate through a " V " rope drive at a speed of 400 to 410 r.p.m. The compressors are fitted with forced lubrication, suction strainers, oil filters, pressure gauges, main stop valves and cross-over connections.

Power Factor Correction

Each compressor is driven by an auto-synchronous motor ranging from 75 to 120 h.p. and running at 1,000 r.p.m. and arranged for 0·9 leading power factor. The preference given to this type of motor is easily understandable, seeing that the majority of supply companies impose a penalty in the form of increased tariffs (usually a fixed charge per kVA of maximum demand) for low power factor, or offer a bonus for high power factor.

This inducement to the consumer makes power factor correction well worth while. It can be achieved by including a synchronous motor in the system, either in place of one of the induction motors or instead of a new induction motor when extra power is required. Such a machine can be designed to take its power from the mains without requiring idle current to magnetise it, and further it can be made to supply magnetising current for induction motors on the same system, thereby raising the total power factor.

The synchronous motor as first used was a salient pole machine which needed special features for starting and synchronising. The starting torque was limited and a heavy starting current was necessary. Efforts to avoid these detrimental features led to the development by one of the leading electrical engineers and manufacturers of the auto-synchronous or self-synchronising motor which, while retaining every advantage of the salient pole machine, has a high starting torque and requires only the simple control gear of the slip-ring induction motor.

Variation of Capacity of Compressors

In some ammonia compressors an interesting feature is that in directly coupling these to the auto-synchronous motors, provision has been made for varying the capacity of the compressors within wide limits at constant speed. This is achieved by special capacity control cylinder heads in which the clearance can be greatly increased by operating the hand wheels mounted over the top of each cylinder.

As much of the goods to be stored may have been in transit longer than is normal owing to war conditions, sufficient power is necessary to produce freezing as well as storage temperatures. It was therefore wisely determined to provide refrigerating equipment of ample capacity with liberal cooling surfaces in the air coolers and in the condensers.

The condensing of the ammonia handled by the compressors is taken care of by either horizontal shell-and-tube condensers working in conjunction with water-cooling towers, or fan-induced draught condensers.

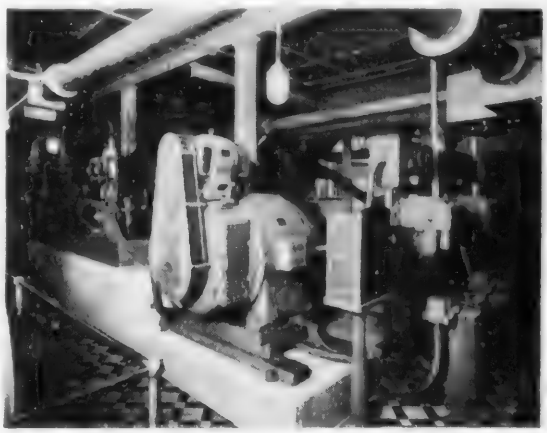
Handling of Condensing Water

Directly coupled are centrifugal circulating water pumps which are cross-connected so that any pump can be operated on each of the condensers. With shell-and-tube condensers these pumps take the condensing water from a tanked room over each engine-room, and, after passing it through the condensers, return it over a cooling tower situated above the engine-room. These cooling towers are designed to cool some 20,000 gallons of water per hour.

Each of the two self-contained engine-rooms has its own condensers, and in order to provide a standby in case of emergency an extra condenser is fitted in one of the engine-rooms.

To make these condensers quite independent, each is provided with its own gas, liquid and water connections, which are all fitted with isolating stop valves, so that any one of the units can be opened up for cleaning without interfering with the operation of the plant. In addition to this, it is common practice to design the end covers of the condensers so that they may be removed without disturbing any ammonia connections.

Induced draught condensers are usually contained within asphalt-lined masonry tanks and encased in brickwork partitions. Suitable air inlet ducts are provided, and an extract fan is installed in the top of each



A Crompton Parkinson 100-h.p. auto-synchronous motor driving a Pontifex 62-ton refrigerated horizontal ammonia compressor. Three 62-ton refrigeration compressors are installed in this compressor room, each driven by a similar motor.

condenser casing, to draw the air through it, and discharge to atmosphere at the engine-room roof.

The average delivery of each water pump is approximately 400 gallons per minute, but as recirculation of the water is employed, the actual consumption of water is reduced to only the necessity of maintaining the loss incurred by evaporation, this make-up being automatically ensured by a float control fitted in the sump tanks. The circulation of the cooling water through the jackets of the compressors is also taken care of by the condenser pumps and water-cooling system.

Independent Air-Coolers

Independent air-coolers are installed, each with its own fan. A typical installation provides for fans driven by 20/40 b.h.p. variable speed commutator type reversible motors through multiple V belts, the fans being capable of delivering from 20,000 to 80,000 cu. ft. of air per minute at full speed.

Several brine cooling systems are employed. In one, the shell-and-tube method of cooling is employed, the centrifugal brine pumps circulating an average of 27,500 gallons per hour over the air coolers. Here the admission of the ammonia to the cooler is under float control.

Another method circulates the brine over cooling coils. This system is provided with either ammonia pump circulation or is arranged for natural circulation of the refrigerant. The liquid from the condenser is fed by the float valve into a low-pressure accumulator or storage tank, from which it is pumped by the ammonia pumps into the coils, the cooling surface of which is extended by steel or corrugated sheets, the whole being sparged by brine. A brine mixing tank to bring the calcium chloride brine up to the strength required is part of the equipment of each cooling room. The quantity of ammonia circulated by the pumps is far in excess of that actually evaporated, and the surplus, together with the gas given off by the evaporation of the liquid in the coils, is returned to the accumulators which are of ample capacity and ensure that the gas passing from the top of them to the main suction manifold of the compressors is in a dry saturated state.

To avoid dead spots it is customary to arrange that the air ducting is of aero-dynamic design which allows for constant equalised pressure throughout the cold store. The main temperature control for air distribution is arranged from special lofts with access from the cooler.

Temperature Control

To maintain a careful watch on temperatures, distance or remote resistance thermometers are installed, thus enabling the engineers on duty to log the temperatures of any portion of the cold store, this including both of the engine-rooms, the brine system, and all positions in the cold rooms.

This is made possible by the installation in each of the two engine-rooms of a multipoint temperature indicator of concise design and bold reading. Fitted in a die-cast case hinged to open outwards the making of connections and the balancing of circuit resistance becomes an easy matter. The mercury in glass switches ensures constant contact resistance and freedom from inaccurate readings which sometimes occur with ordinary contacts. The thermometers fitted in the cold rooms are moisture- and fume-proof.

As will have been gathered from the foregoing description, many features have been introduced from the wide experience of those concerned with the designing, erection and equipping of these cold stores, which have aroused a great deal of interest in scientific and technical circles, while notable visitors to our shores have included a cold store in their itinerary; Mr. Peter Frazer in his official capacity of Prime Minister of New Zealand taking a keen interest in the manner in which stocks from his country are being assembled for routine issue, and against any emergency which may arise. His tribute to the remarkable manner in which both quality and freshness of the nation's wartime food is being maintained is in itself an outstanding testimonial to the thoroughness of the work of the Cold Storage Section of the Ministry of Food, and those to whom the Ministry of Works entrusted the carrying out of the approved plans.

We are indebted to the undermentioned firms for the information from which this article was written and also for the loan of the photographs used as illustrations:

Refrigeration Plant:

Messrs. J. and E. Hall, Ltd., the Lightfoot Refrigeration Co., Ltd., the U.D. Engineering Co., Ltd., Messrs. William Douglas and Sons, Ltd., Messrs. L. Sterne and Co., Ltd.

Electrical Equipment:

Messrs. Crompton Parkinson, Ltd.

Nutrition Society

A MEETING of this Society took place on February 28 at the London School of Hygiene and Tropical Medicine, when a discussion on Food Production and Distribution in relation to Nutritional Needs was held.

Sir John Orr, F.R.S., Director of the Rowett Institute, read a paper on the agricultural implications of a food policy based on nutritional needs. He asked for a food policy based on these as a basis of post-war reconstruction. Great increases in the production of protective foods will be needed to cover the requirements of the population.

During the discussion which followed, Dr. T. F. Macrae pointed out that, although certain diets would ensure adequate nutrition, they might lack flavour, which was important. Drs. E. Kodicek and J. D. King both thought that wartime diet was near the danger point with regard to nicotinic acid.

Dr. Norman Wright dealt with the rival claims of animal and man for food, and Mr. E. T. Halnan with animals as food converters. Mr. Halnan graded livestock according to their ability to transform the protein and energy of fodders into protein and energy for human consumption.

Sir John Russell, F.R.S., spoke on planning for agricultural production, and foresaw a concentration on the production of milk after the war, with which necessarily would grow the production of meat; in combination with arable farming the whole of the increased requirements for liquid milk and for potatoes, 80 per cent. of the vegetables, eggs and poultry, 60 per cent. of the meat and 30 to 40 per cent. of the cheese could be produced at home.

Wartime Packaging*

WITHIN the next few months packaging will at last be put on a war footing. As a result of reports now being examined by the Packaging Sub-Committee of the Materials Committee of the Production Executive (which is directly responsible to the War Cabinet), there is every hope not only that the confusion and muddles of proprietary packaging will be finally ended, but that packaging will be organised on a spartan basis which will ensure the use of as little material as is necessary for the bare protection of the goods.

Presentation to be Simplified

In peacetime the package fulfilled two purposes: to protect the contents, and to sell them to the consumer by attractive presentation and convenience of design. This second function will have to be dispensed with.

Regulations will govern the sizes, style and material of packaging for every article bought by the consumer. Sizes are to be reduced to a minimum—in some cases to a single size.

Colour printing of metal containers will rarely exceed one working, and will be restricted even for board and paper packages.

Pure tin collapsible tubes will, after an appointed day, cease to be available, and it is possible that limitations will be placed even on the use of tin-coated lead tubes.

Tinplate containers will be replaced as far as possible by blackplate cans, lacquered or plain.

Many of these further limitations have been necessitated by the obligation to share British supplies of Nigerian and Bolivian tin with the U.S.A., which has hitherto drawn its supplies from Malayan tin, refined in the Far East. But a far-reaching rationalisation of packaging was in any case planned and has already been forecast in this journal.

Collaboration of Industry

Perhaps the most significant aspect of the changes is that, drastic as they are, they will be adopted willingly by industry and with the minimum of dislocation and protest, because industry itself has designed the "battledress" for its wartime products.

In the summer of last year it was becoming obvious that the official approach to the problem of economising packaging material was mistaken and resulting in friction, muddle and waste. The initiative to economy was taken by the raw material controls—their directing personnel drawn in the main from producing trade interests—working without co-ordination. They were concerned to save tonnage of paper, steel, glass, plastics, without regard to the function of the material as packing.

The granting of a licence to use paper, for example, was no guarantee that the paper could, in fact, be obtained. Usually, no manufacturer could hope to obtain supplies of a particular package material if he had not been a consumer of it before the war, even though the material he had been using had in the meantime vanished from the market and the material he wished to substitute for it was the most efficient from the point of view of the national wartime economy. It was no concern of the various controllers if the containers manufactured from the allocated material were extravagant in their consumption of the material. It was nobody's business to see that the amount of paper, board, tinplate, glass and plastics which could be spared for packaging was used to the best advantage to deliver essential consumer goods—and *only* essential goods—to the public. It was nobody's responsibility that the surface decoration of the packages, using up precious pigments and labour, with the exception of economies enforced by particular circumstances, remained essentially the same as for packages designed for competitive selling.

Incidence of Shortages

Shortages showed themselves not simultaneously, but as the result of changes in the war situation. First tinplate became scarce; the steel was needed for munitions, and tinplate was in any case expected to make an ideal foreign-currency-earning export. So many users of cans sought board and composite containers. The conquest of Norway made the paper shortage acute. Manufacturers changed over to glass containers.

When the Low Countries were invaded we lost the Dutch strawboard. And the English glass industry was called on to supply much of the glass with which Belgium used to supply the world at the same time that the *Luftwaffe* was smashing quite a lot of windows. So users of those glass containers which brought least profit to the glass industry were told to look elsewhere for their containers. Many harassed manufacturers hopefully investigated the possibilities of using moulded plastic containers, but armaments demands were filling the moulding works and metal moulds were usually procurable—if at all—only after months of delay.

Work of British Standards Institution

This story of drift and lack of plan made proprietary manufacturers welcome the possibility of action, however drastic, offered to them by the work undertaken by the British Standards Institution at the request of the Production Executive. An alternative line of approach might have been the appointment of a Package Controller, but most of the hundreds of firms who have been drawn into consultation with the B.S.I. on this matter will agree that the method of approach adopted by the Institution is so much more effective and satisfactory than the policy of the Controls that it might well serve as a basis for remodelling the Controls themselves.

The B.S.I. had long ago worked out, in peacetime, a technique of consultation far more efficient in securing results without fuss and friction than the method of peremptory orders and directions by which the Controls must operate. The B.S.I. method may be slower, but the possibility of delay due to intransigent individualism is in wartime largely removed by two facts: one is the inescapable limitation of shortage of

raw materials; the other is the existence, behind the framework of free consultation, of the sanction of ministerial compulsion.

For the ambitious programme of package rationalisation, on which about a hundred committees appointed by the Institution are at work, there is the excellent model and precedent of the schedules of standard sizes and types of tins and cans drawn up in the early stages of the war. These schedules will no doubt soon have to be revised in the light of the tin situation, for blackplate must be substituted for tinplate wherever possible. But the fundamental task of the B.S.I. was to frame for packages as a whole comprehensive schedules on these lines, irrespective of the material of which the packages were to be made.

The committee on pharmaceutical, cosmetic and other chemical packages was the first to start work. Progress has been slower than was at first hoped owing to the complexity of the subject, but recommendations covering a great many articles have already been framed and many firms who have collaborated in, or agreed to, the decisions are, in fact, anticipating the restrictions to be imposed by using containers of the style and size which will be stipulated.

Blackplate for Metal Containers

The change-over to blackplate for metal containers, enforced by the acute shortage of tin, involves a great many consequences, not all of them immediate or obvious. In the first place, lacquer research has still to produce the ideal coatings for the protection of many products, and the work of finding them must be done without delay. In the second place, the lacquering facilities of the country would be insufficient for anything like a complete replacement of tinplate by lacquered blackplate. The pressure will be in part relieved by a prohibition of the use of tinplate for all products for which blackplate alone, without any protective lacquer, can be used.

Shortage of tin will also create difficulties in connection with soldering. The solder makes its bond with the tin coating of tinplate and will not "take" on blackplate without very corrosive fluxes which cannot be used for many products. The difficulty can be overcome in the smaller cans by use of a sealing composition in the seams, but the flexing of larger cans tends to break the composition.

A chemical method of preventing rusting of blackplate, which is an alternative to lacquering, is the *Brunofix* process, which imparts to the metal a black surface, integral with the metal itself, which cannot be removed. This process, however, involves immersion of the finished container and cannot be applied to the blackplate in sheet form.

Returnable Containers

A further difficulty in the utilisation of blackplate concerns the multi-trip, returnable container, used by some manufacturers for supplying bulk products to the retail trade. It is customary to sterilise such containers after each trip by a process invariably entailing the use of steam and a caustic detergent. This would destroy the lacquer on blackplate and greatly shorten the life of the container. Here the *Brunofix* process might well be a reasonable solution of the difficulty.

In conclusion, a word might be said on an aspect of the packaging situation which bears directly on economy. Not much has been done by the chemical industries—even by those firms whose control of retail shops gives them direct contact with the public—to secure the salvage and re-use of containers. There seems to be some doubt on the part of most firms as to whether they would be permitted to regard such salvaged material as an addition to their quota of packaging supplies or whether it would have to be relinquished for the general national good. As troublesome collection and propaganda arrangements are not likely to be made without some practical inducement, it seems highly desirable that the salvage authorities and the raw material controls should issue a ruling on the subject. The institution of the practice of selling a new package only on the surrender of a used container would be practicable wherever the product is in regular use.

*, Abstracted from *Manufacturing Chemist*.

Book Reviews

Sausages, Sweets and Butter

The modern sausage maker must be an anatomist, a physiologist, a physicist, an engineer and a chemist, or at least a bit of all. So declares Frank Gerrard, who is No. 1 instructor and lecturer at the Smithfield Meat Trades Institute, and he should know. He is also author of *Small Goods Production*, the second edition of which is in the press. Originally published in 1935, it has been a *vade mecum* for a succession of small manufacturers.

The subject matter has been augmented and its arrangement improved. To treat the practical aspects of the manufacturing processes in a simple fashion, assuming that the average reader will not possess an advanced technical knowledge, is not an easy task owing to the technical nature of the subject, but the writer has done it very well.

The main subject is sausages and for their making a thorough knowledge of meat is essential, which knowledge is acquired by experience, but the period of apprenticeship can be greatly reduced by an intelligent appreciation of meat constituents and the changes they undergo in the course of manufacture. This, says the author, will provide a wide range of study, embracing not only anatomy and physiology, but also mechanics, physics and some chemistry to complete the picture.

Mr. Gerrard deftly mixes technical details with plain honest-to-goodness practical advice, and his chapter on the mechanics of the different items of equipment for sausage making is admirable.

The chapters on sausage ingredients are clear and concise, and on seasonings Mr. Gerrard gives the reader a good synopsis of aromatic herbs and seeds suitable for the purpose.

Recipes are oft-times looked upon askance, and the question arises—will they work? The author, in giving a large number of recipes for sausages and "small goods", also gives his assurance that all have

been personally tested, which should certainly give confidence to the user of the book.

The meat-curing chapter is well done, although apart from two recipes for spiced brines it might have been useful to give some quantitative data regarding nitrate and nitrite, and also to mention that the salt used is sodium nitrite. Excess of nitrite in a pickle produces a very unpleasant taste, almost approximating to a "paraffin taste". For the hot pickling process described in the text, 1 part of sodium nitrite per 1,000 parts of pickle is ample.

The important subject of costing is well covered, as is also the utilisation of waste or perhaps better described as by-products. It is certain that those who have possessed the first edition of Mr. Gerrard's book will look forward to acquiring the second.

Another book which has recently been published in its third edition is one by N. F. Scarborough, A.M.I.Mech.E.* This is also one which is based on practical experience both in mass production and in small-scale manufacture of quality lines.

The author has taken the opportunity of giving extra recipes, but owing to the prevailing conditions he has avoided suggesting wholesale alterations in manufacturing procedure.

The book covers the discussion of raw materials, sugar boiling, caramels, toffees, fudges, nougats, jellies, jubes and gums; in fact, the whole range of sugar confectionery, recipes for which are given.

A new chapter deals with the control of cost and quality. The author gives an interesting account of an investigation which was made into the affairs of a factory whose products enjoyed good sales. A comparison of the amounts of raw material purchased and finished goods sold appeared to reveal undue discrepancies, though, having regard to the fact that some two or three hundred different articles were in normal production and that varying amounts of all these were in the factory at different stages of production at any given time, no really conclusive evidence could be obtained.

It was therefore decided to commence detailed investigation in one particular department, and if the results warranted it to apply the principles learned to the whole organisation. Arrangements were therefore made for an independent investigator to visit this particular department and make random checks on obviously weak points after having noted general procedure.

The account of what was found to be wrong will doubtless be instructive to confectionery manufacturers.

Embodying a revision of *Principles and Practice of Butter-making*, by McKay and Larsen, is a book which has reached its fourth edition.† The authors are attached to the Division of Agriculture of the South Dakota State College and have ranged widely in the United States to draw upon examples of good practice in butter-making. The book is almost an encyclopædia of U.S. standards, legal requirements, practice, and production. It has been written with the idea of providing a textbook for undergraduate instruction and of furnishing useful information to operators of creamery and butter plants. In the latter aim it fully succeeds. It deals with all economic and practical aspects of milk and cream as raw materials of butter, with churning and ancillary operations, sanitation, refrigeration, and even with washing powders. The monetary importance of having a good man as butter-maker and of avoiding losses from various indicated causes is stressed. Questions for students are appended.

On the theoretical side the book is somewhat unbalanced from the point of view of undergraduate instruction. Thus the question, "What is meant by the germicidal property of milk? How would you proceed to demonstrate the existence or absence of such factors [*sic*]?" would tax most professional bacteriologists: the book itself does not give much help on the point. The fundamental matter of the existence of lactic acid in milk, cream, and butter is not squarely introduced but is slid in in connection with neutralisation calculations; from an empirical point of view these are well demonstrated, though one simple arithmetical method is said to be too difficult for most students. Citric acid appears in the index, but lactic acid, carotene, and many other important subjects do not.

The handling of matters relating to fatty acids is very defective. The theory is introduced in one short paragraph which discusses mixed glycerides, lecithin, and rancidity all at once (rancidity is taken to be synonymous with hydrolysis to free fatty acids). The composition of butterfat is given in one table: there are 8 per cent. of volatile, and 92 per cent. of non-volatile, fats, of which the individual percentages are roundly given in single figures without minimum and maximum values or any clue to the fact that the "fats" are fatty acids. There are two brief mentions later of increases in olein content affecting the firmness of butter, but the possible presence of other liquid "fats" receives scant consideration. An undergraduate course must have some theory, one supposes, but in this case it does not seem to have been properly understood by the instructors, who seem glad to pass on to more practical matters. If the butter won't come in the churn, not even Professor Hilditch would be able to help; and this supposition may, of course, be well founded. However, in a book of this size one could expect more authoritative and detailed information about composition. Treatment of vitamins is also sketchy, and, characteristically, the section on colouring butter artificially makes no reference to the theoretical knowledge about carotene introduced earlier.

Altogether a very good book for the practical operator, but beyond tribute to the graceful notion of giving biographical notices of some benefactors of the dairy industry there is not much that can be said for the exposition of underlying principles. It seems a pity that the book was not confined to practice, with which the authors are evidently familiar, and which they expound clearly.

H. N.

* *Sweet Manufacture*. N. F. Scarborough, A.M.I.Mech.E. Third Edition. Pp. 122+x. 1941.

† *Butter*. Claire C. Totman, the late G. L. McKay, and Christian Larsen. Fourth edition. Pp. vii+472. Figs. 134. London. 1939. 21s. net.

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in FOOD MANUFACTURE should not be taken as an indication that they are necessarily available for export.

News from the Industry

Jam and Fruit Products Equipment

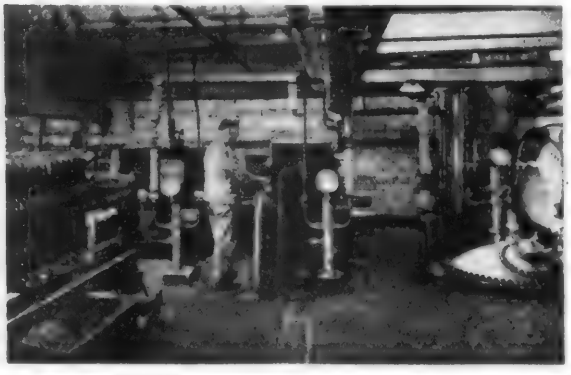
Fruit Juice Extraction and Filtration

Instead of rows of steaming barrels, crude gravity filters, and cumbersome hydraulic presses of the old days, with all their attendant mess, modern plant is smart, compact and well designed. It consists of a large enclosed copper steam-jacketed pan, replete with pressure gauges, steam, water, and dual compressed-air and steam pipe connections, a stirring device, and a manhole at the top for filling. This is the autoclave, in which the fruit is cooked and prepared. By the side of the autoclave is a cylindrical calibrating tank for measuring and preheating the water. Conveniently nearby is situated a coarse or pulp filter press, connected by pipe to the autoclave, through which the fruit pulp is forced from the autoclave by compressed air.

A stream of hot crude juice runs into a cylindrical copper receiver arranged below the filter press. Along with this juice is mixed a small quantity of kieselguhr. The receiver is provided with a stirrer, which keeps the kieselguhr and juice thoroughly mixed. Compressed air is applied to the receiver, and the crude juice is forced at a regulated speed and without pulsation through a fine filter press, which extracts all the solid matter, and delivers a perfect transparent juice, the secret of so many firms' brilliant jellies and jelly marmalades.

From the fine filter press juice flows by gravity into storage tanks. These in turn are connected to the Automatic Pan Charging System by pipes. This system extracts every scrap of virtue and pectin from the fruit.

With the Kellie - Yates System of Robert Kellie and Son, Ltd., every available drop of juice from a boiling is available within one-and-a-half hours of the commencement of the process.



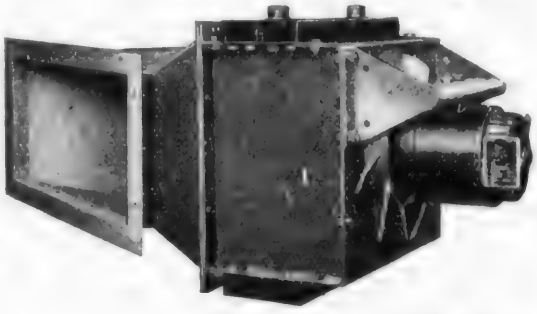
General upper view of the Kellie-Yates Juice Extraction and Filtration Plant, showing top of Autoclave, Water Preheating and Calibrating Tank, Coarse or Pulp Filter Press and Fine or Juice Filter Press.

* * *

The Drying of Fruit

The drying of fruit on the farm, metal and glass containers of all types, etc., is effected by Spiral Tube Unit Heaters. Manufacturers of mechanical drying and handling equipment find them particularly adaptable as the range of sizes and temperatures is sufficient for all requirements.

The illustration shows a typical twin section high temperature rise Unit which is supplied with electric motor driven fan and connection for coupling to the side of the dryer.



Pectin Supplies for Jam

The position with regard to pectin supplies has been a difficult one ever since war broke out, and now the shortage of fruit, coupled with lower fruit standards and increased outputs of jam, have increased the requirements of pectin to almost three times the pre-war tonnage. This, together with the fact that shipping space in which to import pectin is limited, has put a great strain on home production to meet the demand. Unfortunately, also, a big proportion of trained key men have been taken into the Forces, and it is only recently that protection has been arranged for present employees engaged in production.

Practically all plant is specially made, and inevitable delays occur in getting priority certificates for materials for maintenance and repairs.

Notwithstanding all these things, William Evans and Co. (Hereford and Devon) Ltd., are producing an increased amount, but still insufficient to meet the excessive demand of to-day. Those who may be disappointed with the amount of pectin they are able to obtain are assured that the utmost efforts are being made to keep up the output of this commodity, which is so very essential to the jam industry.

* * *

Controlling Jam Boiling

Among the requisites of a thermometer to be used in connection with jam boiling are accuracy and robustness. Thermometers which have the following addi-

tional features are now widely used in the industry.

Thermometers to be used for the purpose should also have a long stem, made either of stainless steel or copper. It is essential that the bulb guard should adequately protect the bulb and that clogging by fruit pith or stones should be avoided.

Short and Mason, Ltd., who specialise in temperature control instruments, have produced an excellent type, with a scale 12 inches long, of short range, and graduated in ½° F. divisions.

For fruit bottling, where the temperature of the water in the exhausters is extremely important, and lies at a selected point between 180° and 190° F., the firm's type "P" controller is recommended.

* * *

Clarification of Fruit Juices

Of wide application in the fruit industry the system of centrifugal clarification is being used in such operations as the production of non-alcoholic apple juices in connection with the Long Ashton process, and also for the clarification of soft fruit juices used in the manufacture of fruit syrup.

Two further applications are the clarifications of rose-hip and carrot juices, and centrifuges may also be used for the extraction of carotene from carrot pomace.

In these days when servicing of plant presents a problem, due to scarcity of labour, simplicity of construction is an asset which is possessed by the centrifuge. It is also manufactured in materials resistant to fruit acid corrosives.

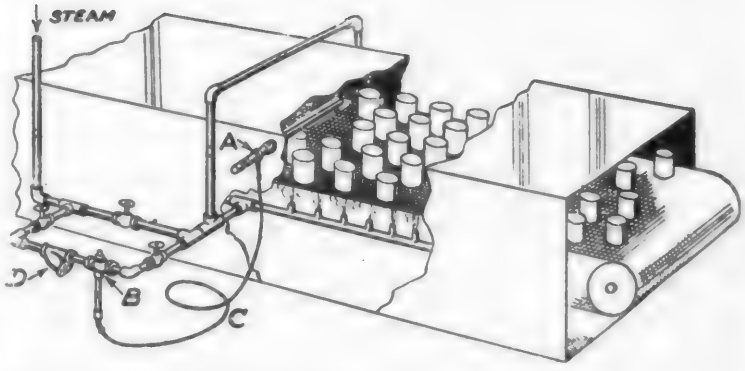
The illustration shows a typical centrifuge made by Sharples Centrifuges, Ltd.

* * *

Acid-Proof Flooring

A specific floor for a particular purpose is a modern innovation especially where hard wear and resistance to acids are prime considerations.

The illustration shows a Ferrogran Steel-Faced Flag Floor recently laid in the green fruit department of a large Co-operative Society. These flags—made under 250 tons pressure—have a quarter of an inch surface thickness of steel and consequently stand up to extremely heavy traffic. They are non-dusting, non-slip and are made from the very best quality materials. The "Cement Prodor" used by the makers, Prodorite, Ltd., in connection with their acid-proofing schemes is the very best obtainable and can be used with excellent results in any situation where acid, liquors or fumes are present.



Exhauster Control

The control of the temperature of exhausting is an important item in canning operations.

The illustration shows a typical exhauster in which a regulator A is fitted just above the cans as they move through. The regulator is connected by a capillary tube C to the control valve at B, which is fitted on the steam supply to the exhauster. The control valve is protected by the strainer D.

Thermostatic control finds a host of other applications in the food industry, *e.g.*, in glass bottle and jar washing, where overheating will produce breakages and underheating inefficient cleansing. Other important applications are temperature control of retorting, in cold storage, etc. Sarco regulators are used in the foregoing and other operations and one of their advantages is that they are independent of any outside source of power, such as electricity, compressed air or water.

Automatic temperature control has gained its pre-eminent position in industry because of the economies it makes possible.

Fruit Handling Equipment

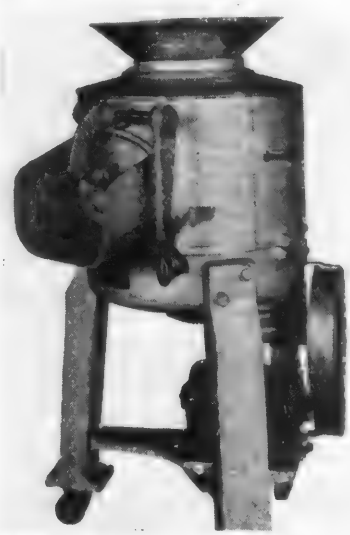
A useful power-driven machine which was designed for topping and tailing gooseberries but can also be used for peeling potatoes, carrots, turnips, beet, etc., has recently been re-designed.

The fruit or vegetables are dumped into the feeding hopper 50 lb. at a time. When the operation is finished, the delivery door is opened and the fruit or vegetables are discharged by centrifugal force. The door is then closed and another batch dumped into the machine. The total time of each operation is one minute, which is equal to an output of over one ton per hour.

Another machine is specially designed for cleaning new potatoes and new carrots, whose skins are thin and easily removed. It is of design similar to the previously described machine with the exception that the chamber is lined with brush segments instead of carborundum. The revolving bottom plate is also fitted with brushes.

Among other recent types of machines is that for peeling potatoes, carrots, turnips, beets, etc., in large quantities. It is divided into four compartments, each compartment having four steel rollers which are covered with carborundum of different grades.

Many other pieces of equipment of interest to those handling fruit and vegetables are made by William Brierley, Collier and Hartley, Ltd.



Salvage of Block Metal

Recent developments in the war situation have rendered imperative an immediate and sustained effort to increase the salvage of all printing plates for armament production.

The continuance of supplies of new metal to the trade for 1942 depends on the response of all owners of blocks to a salvage appeal, issued with the authority of the Ministry of Supply, by the Metal Rationing Committee, which has opened a new receiving depot at 1 and 2, Slingsby Place, Long Acre, W.C. 2.

Metals sent to the depot will be sold and if the owner is willing the proceeds, less collection expenses, will be divided by the Metal Rationing Committee between the British Red Cross, Mrs. Churchill's Aid for Russia Fund and the Benevolent Fund of the Co-operating Trade Associations of the Printing and Allied Trades.

Alternatively, if the owner desires payment, he will receive market price according to the class of metal and whether mounted or unmounted.

The disposal of all used blocks should be arranged for. If the metal is in London its collection can be effected if it cannot be otherwise delivered. If in the provinces the metal should be sent to the depot or to a local scrap dealer.

It is most important that for all sales to scrap metal merchants a certificate should be obtained showing the net weights of each class of metal. This certificate should be sent to the Metal Rationing Committee at the address shown below, to support applications by the trade for supplementary rations.

The address of the Metal Rationing Committee is Room 270, Bank Chambers, 329, High Holborn, W.C. 1. Tel.: Holborn 0910.

* * *

Appointment

Major Gwilym Lloyd George, P.C., M.P., Parliamentary Secretary to the Ministry of Food, has appointed Mr. R. Moelwyn Hughes, M.P., to be his Parliamentary Private Secretary.

Sampling of Food

The Minister of Food has made an Order—The Sampling of Food Order, 1942—which permits Enforcement Inspectors employed by or on behalf of the Ministry and other duly authorised officers to enter any premises in which they have reasonable cause to believe that food is being manufactured, or prepared, or is deposited, or stored, or exposed for sale, and to take samples of such food for the purpose of ensuring compliance with any of the Minister's Orders or for facilitating the introduction or operation of any scheme of control.

These officers may take samples of any article of food notwithstanding any restrictions upon the purchase or obtaining of such articles contained in the Rationing or other Orders of the Minister for the time being in force.

* * *

Manufacture of Canned Fish Products

The Ministry of Food has decided that on and after May 1, 1942, the canning of fish products other than fish paste will be prohibited. Canning is defined as preserving in a tin, jar, or other airtight container.

Communications on this matter are being addressed to all holders of licences to can fish products issued under the Canned Fish (Control) Order, 1941, as amended.

Manufacturers of canned fish products are reminded that a licence under this Order is required.

* * *

Prices of Bakery Grades of Margarine, etc.

The Ministry of Food announces that the price of the following commodities will be increased by 4s. 6d. per cwt. from March 30:

Unsalted Cake Margarine.
Salted Cake Margarine.
Pastry Margarine.
Compound Cooking Fat.
Dripping.

The prices of counter grades of margarine remain unaltered.

Saving Tin and Lead

To save more tin and lead the Ministry of Supply has made an Order further limiting the use of these metals.

The new Order prohibited the cutting up of plain tin-plate for the manufacture of packages and crown corks for civilian use after April 14. Sheet steel uncoated with tin or lead will be used instead.

Amongst the commodities affected are biscuits, confectionery, coffee, syrup, dried milk and milk foods, and tobacco, oils, polishes, many pharmaceutical and toilet articles, certain agricultural products and ink.

The new containers will generally be the same size and type as existing ones, but in most cases the steel will be coated with protective lacquers and varnishes in place of the normal coating of tin.

The restrictions have been designed to ensure that adequate protection of the product packed still exists, and where containers are decorated, opportunity has been taken in many cases so to amend the appearance that labour and materials used will be reduced to a minimum.

An important result of these changes will be that most of the types of tins for vacuum packing of coffee and tobacco will cease to be made.

Copies of the Order, the Control of Tins, Cans, Kegs, Drums and Packaging Pails (No. 6) Order, 1942, which supplements and adds to the existing No. 5 Order, can be obtained from H.M. Stationery Office, York House, Kingsway, W.C. 2, or through any bookseller (Price 1d.).

* * *

Salvage Appointment

Mr. G. B. Hutchings, the Director of Salvage and Recovery of the Ministry of Supply, has joined the board of the Waste Paper Recovery Association.

This non-profit-making Association was formed for the purpose of stimulating the salvage of waste paper, cardboard, etc., and the economy in its use. The directors are representatives of the newspapers, the periodicals, the board mills, and the paper mills.

The appointment of Mr. Hutchings is for the purpose of ensuring the closest possible liaison between the Association and the Salvage Department of the Ministry, and is made with the approval of Sir Andrew Duncan, Minister of Supply.

* * *

Tartaric Acid and Cream of Tartar

The Ministry of Food has announced that supplies of tartaric acid and cream of tartar are limited, and when the present small stocks are exhausted further quantities may not be available for the baking industry.

Pyro cream powder and acid calcium phosphate are available and are suitable alternatives. Citric acid is available to meet the normal demand.

* * *

Import Licences for Spices

The Ministry of Food reminds would-be importers of spices that applications for import licences, which must state the c.i.f. value, can only be granted with the approval of the Ministry.

The Ministry wishes to point out that, in general, approval will not be given to applications where this value is above the c.i.f. values now ruling.

Air-Conditioning and Drying

An eighty-page illustrated booklet which describes a large number of applications of air-conditioning and drying plant has just been received. The importance of air-conditioning in almost every branch of the food industry is emphasised by ample details relating to specific cases.

Descriptions of drying plant include compartment dryers, drying kilns, endless chain pressure drying machines, progressive tunnel dryers, spray dryers and others.

Among a number of other sections, those dealing with equipment for cooling and refrigeration; steam removal and vapour absorption plant; and dust removal and collection plant are of particular interest.

The publishers, Davidson and Co., Ltd., makers of the "Sirocco" products, are to be congratulated on having been able to produce such a handsome volume at the present day.

Scottish Food Manufacture

Scottish business men are out to get more food manufacturing plants for the north. This was ventilated at the first meeting of the newly formed Scottish Industrial Council, sponsored by Mr. Thomas Johnston, Secretary of State of Scotland, and embracing all the major Scottish trade and commercial bodies on its committees.

During the weeks preceding the meeting Mr. Johnston said he and the chief office-bearers had already taken up certain points. Among these was the fact that Scotland fell far short of getting her 11-80 share of the nation's industry, and among other aspects that of synthetic food had been brought to the notice of the Ministry of Food.

The Council promises to become a major trading body responsible for policy and practice in many spheres of Scottish industry since its *personnel* covers most of the leading business men and industries in the north.

Among well-known food men who are members are Sir Gilbert Archer, Sir A. Steven Bilsland, Bart., and Captain J. P. Younger.

* * *

Welding Data

Because welding is now being used more extensively than ever before, more manufacturers are starting welding shops to meet the demand for munitions production. There is, therefore, an urgent need for authentic information on this subject.

The Lincoln *Weldirectory*, just published, gives the working procedures and the use of thirty-seven different electrodes for welding high tensile steels, copper, bronze, brass, aluminium, cast-iron and chrome-moly steel, as well as mild steel—a subject of particular interest to those engaged in structural work or the manufacture of machinery and machine parts, boilers, pipelines, shipbuilding and pressure vessel construction.

It also contains the working characteristics of electrodes for resisting different types of wear, building up worn cutting tools, and refacing parts subject to abrasion and corrosion—an important factor when metal economy is essential.

Pocket Test Thermometer

A thermometer which has a pointed and reinforced bulb, which enables it to be inserted into any semi-solid matter, such as cheese, fruit or yeast, with perfect safety, has been designed recently. The bulb makes direct contact with the substance tested thus, ensuring a quick and accurate reading.

The chromium-plated brass case is fitted with a special top whereby, by unscrewing the cap from the bushing, the thermometer is easily removed for cleaning; this feature also enables a replacement tube to be quickly and effectively fitted. The over-all length is 6½ ft., and the scale range may be made to order. It is made by the Industrial Thermometer Company.

* * *

Biochemical Analysis Course

A course in preparation for the Diploma in Biochemical Analysis is to be held at the Chelsea Polytechnic, S.W.3. The course, which began on April 20, will extend over about sixteen weeks, and is conducted by Dr. H. E. Archer, M.R.C.S., L.R.C.P., F.I.C., Ph.C., chemical pathologist to the West London Hospital, who is assisted in physiology and pathology by Miss A. M. Stratford, B.Sc. The fee for the complete course is ten guineas. The lectures are given on Monday, Tuesday and Thursday evenings from 6 to 9 p.m. The examination will be held late in September or early in October, 1942.

* * *

Manufacture of Milk Bottle Caps

One result of the spread of the war to the Far East is that supplies of tin must be curtailed. In consequence the Non-ferrous Metals Control decided to release, from April 1, aluminium for the manufacture of milk bottle caps. Aluminium strip was delivered during April, but the manufacture of the caps themselves did not begin before the end of the month, in order to give time to use up existing stocks of tin-zinc alloy strip and caps.

In view of the vital need to conserve aluminium, dairymen will be doing a valuable service if they can ensure the greatest possible return of used caps for salvage.

British Growers' Publicity Council

Owing to circumstances resulting from the war the British Growers' Publicity Council regretfully has decided to suspend further activities for the duration.

We understand that the Council will remain in being and the future of the work will again be reviewed in the light of the position at the conclusion of the war.

Mr. C. H. B. Kenyon, Public Relations Officer to the Council, who has been in charge of the horticultural publicity since its inauguration by the Marketing Board, has been appointed to represent the Ministry of Agriculture at the Ministry of Information.

* * *

Changes of Address

The firms of S. W. and I. Smith, Animal Food Manufacturers, and Frank Smith, Macaroni Manufacturer, were amalgamated as from April 5, 1942, under the name of "Smith's", Cereal Food Manufacturers, to meet the present conditions of trading.

All communications (correspondence, accounts, purchase, and sales) should be addressed to: New Street Chambers, New Street, Coney Street, York. Telephone No.: York 53346.

* * *

The address of Chemia Products, Limited, is now 27-28, Finsbury Square, London, E.C.2. Telephone: Kelvin 5097/8 (2 lines). Telegrams: Chemosan, Finsquare, London.

* * *

Lost Working Hours

Efficiency is impaired and output suffers if even a small proportion of women employees are harassed regularly by dysmenorrhœa. Some tablets, marketed by E. Griffiths Hughes, Ltd., are claimed so to alleviate symptoms that workers are enabled to carry on work when otherwise they would have to rest for an hour or so. We are informed that a number of well-known food manufacturers are using the product through their welfare departments.

The Electrical Equipment of an Industrial Canteen

It has been decreed that all factories employing 250 or more workpeople shall be equipped with a canteen of such capacity as to provide each person with one cooked meal per day.

It is significant that, in a high proportion of the canteen kitchens established under the order, electrically heated cooking equipment is installed. The efficiency and the economy of such apparatus is perhaps best illustrated by the recently opened canteen of a large engineering works in the south of England.

The main equipment of the kitchen is of G.E.C. manufacture and is electrically operated.

It includes four double-oven cooking ranges each with a maximum loading of 30·6 kw.; four hot-cupboards each with a connected load of 5·2 kw.; two 6·25 kw. vegetable boilers; one 3-pan fish fryer with a total loading of 21 kw.; two steaming-ovens rated at 12 kw. each; one 250-gallon storage water heater; and one Coldair refrigerator of 8 cu. ft. capacity; and a cold room, also by Coldair, with a food storage capacity of 125 cu. ft.

Apart from the S.M.S. express lift previously mentioned, other electrical equipment includes two G.E.C. unit heaters each possessing a heating capacity of 51,180 B.Th.U. per hour. These are used as supplementary heating in the upper floor dining hall.

As criteria of the quantity of food cooked each day it is of interest to note that the total capacity of the four ovens is approximately 28 cu. ft. and the total hotplate area available is over 17 sq. ft. This, comprising hotplates, is 24 ins. by 16 ins., 12 ins. by 8 ins., and 8 ins. by 6 ins. The dimensions and capacities of the other equipment are of the same generous proportions, so that the quick service of really hot and wholesome food is assured.

Most heating elements of the equipment are fitted with variable heat control, thus ensuring the maximum flexibility and correct cooking temperatures.

Lighting fittings, conduit and all switchgear are by the General Electric Co., Ltd., whose engineers were responsible for the complete installation.

*p*H Determination

The importance of *p*H determination in manufacturing processes is becoming increasingly evident. Two portable instruments, one mains operated and the other battery operated, have been designed for the laboratory, although they have many applications in connection with works control. The accuracy of measurement is within ·02 *p*H and the range is 0-14 *p*H (0-1,400 millivolts). These instruments are designed for use with the Marconi Glass Electrode system, but other electrode systems can be supplied if so desired.

For processing control there is a wide selection of *p*H recording gear and control equipment. Two distinct types of recorders are available, one which will give continuous chart records of *p*H over long periods and has facility for the fitting of one or more remote indicators, the other incorporates the Marconi Electrometer unit and Bristol Pyrometer Recorder, this instrument having a circular 24-hour recording chart and can be adapted to control.

The accuracy of measurement obtained with the recorders is 0·1 *p*H, and they may be supplied for operation on any selected *p*H range between 0-14 *p*H. These equipments are made by Marconi Instruments Ltd.

* * *

Arachis Oil

There is still some uncertainty regarding the method of purchasing ground-nut or arachis oil. Olive oil is, of course, in very short supply; many wholesalers have been out of stock for months, but chemists may buy a corresponding quantity of arachis oil for their manufacturing and dispensing requirements, if they can prove that in the comparable year, July 1, 1938, to June 30, 1939, they bought from their wholesaler a definite quantity of olive oil. The Ministry of Food will then allocate to them a quantity of arachis oil. The application should be made on forms OF 240, D and E, obtained from the Ministry of Food, Oils and Fats Area Distribution Office, the address of which can be obtained from the local food office.

Potato Cubes for Canned Hash

Several U.S.A. packers canning corned beef hash have reported substantial savings through the use of dehydrated potato cubes instead of the fresh vegetable. Principal savings accrue from elimination of car-unloading labour, peeling labour and waste and shrinkage which is normal in ordinary handling, says *Meat*.

The cubes are made from Idaho potatoes that are washed, peeled, cubed, blanched and dried. It takes 10 lb. of Idaho potatoes to make 1 lb. of cubes. Reconstituted by soaking in water, 1 lb. of cubes are said to weigh 5½ lb. with colour and flavour unchanged. The size of the cube is $\frac{3}{16}$ in. by $\frac{3}{16}$ in. by ¼ in.

The B. A. I. has approved these cubes for hash under Amendment 15. This ingredient is to be listed as "dried diced potato". The Army has tested them and approved their use in Army Ration.

* * *

National Fuel Economy

As a contribution to the national campaign for greater fuel economy, the Spirax Manufacturing Co., Ltd., placed at the disposal of the Mines Department, Fuel Efficiency Committee, their full advertising page in the April issue of FOOD MANUFACTURE.

The figures given by the Mines Department show what an enormous amount of heat can be lost through bare piping. Even when coal was cheap and easy to get, many a steam pipe went unlagged because lagging seemed too expensive. Lagging is still expensive, but not so expensive as the coal which is wasted through want of it.

Based on 100 ft. of uncovered steel piping carrying steam at 150 lb. pressure, losses through a 1-in. pipe are 24 tons a year, through a 3-in. pipe 64 tons, and through a 6-in. pipe 121 tons. Figures are based on coal having 12,000 B.Th.U. a lb. on a boiler with over-all efficiency of 60 per cent., and working 24 hours a day 365 days a year. Many other interesting data are given.

Spirax Manufacturing Co., Ltd., are to be commended for their gesture in favour of the national campaign.

Fighting Fatigue

Many of the diseases of our time are directly attributable to the spine and this fact is important when it is considered that there is a tremendous variation in types of machinery and other working equipment at which operators have to be seated.

An excellent booklet entitled "Sit at Ease", described as an illustrated treatise to aid sedentary workers, clearly puts forward the arguments for the importance of a correct sitting posture, the elements of which are (*a*) correct height of seat, (*b*) correct height of backrest, (*c*) correct height of footrail or footrest (if one is necessary), (*d*) correct position and angle of backrest and (*e*) correct size, contour and slope of seat.

A large number of photographs show both the correct and incorrect ways of sitting at different types of work and details of ideal arrangements are given. Under war conditions considerations of fatigue are of the utmost importance and the suggestions given in the booklet, which is published by Evertaut, Ltd., makers of a large assortment of seats for operatives, should be of interest to food manufacturers.

The illustration shows an operator whose work calls for the arms to be raised and extended. This renders correct spinal support more essential.

Joseph Nathan and Co.

Joseph Nathan and Co., proprietors of "Glaxo" foods, are maintaining the dividend for the year to September 30 at 10 per cent. The net profit is stated as £81,849, against £87,600.

Paid-up capital is £779,635 in 500,000 "A" £1 7 per cent. Cumulative Preference (quoted at 25s.), 400,000 10s. 8 per cent Cumulative Preferred (quoted at 10s.) and 159,270 10s. Ordinary (quoted at 15s.).

* * *

Derby Preservers Merger

Hazlewood's (Proprietary) has been registered as a public company with a capital of £120,000. The objects are to acquire the issued share capital of Hazlewood and Co. (Products) (incorporated in 1931), Hazlewood's Glass Bottles (incorporated in 1937) and Rowditch Properties (incorporated in 1935), and to carry on the business of vinegar brewers and preservers.

The directors are: Messrs. Wm. Hazlewood, Arthur Hazlewood, Alfred E. Brown, James H. Wood, all directors of Hazlewood and Co. (Products), and James D. Kyle, C.A., 60, Park Lane, W.1. Registered office is at Empire Works, Rowditch, Derby.

* * *

Squirrel Confectionery Company

The Squirrel Confectionery Company, of Stockport, is to pay a special bonus of 7½ per cent., less tax, for 1940, bringing the distribution for that year to 20 per cent.

The total for 1941 is also being made up to 20 per cent. with a final of 12½ per cent., payable March 27. The 12½ per cent. for 1940 was paid on account pending settlement of E.P.T. liability.

* * *

Institute of Chemistry

On January 30, 1940, the institute's register contained the names of 2,326 fellows, 5,713 associates and 785 members. The total number shows an increase over the past year of 264. Dr. J. J. Fox has been re-elected president of the Institute.

Confectioners' Profit

Barratt and Co., confectioners, announces a trading profit for 1941, after providing for E.P.T. and war damage contribution, of £68,455 (£69,247), plus investment income £13,365 (£11,829), making £81,820 (£81,076).

Board fees were £2,062 (£1,125) and income tax £15,000 (£14,561), leaving net profit of £64,757 (£65,391).

Transfer to general reserve is £10,000 (£10,500). Final dividend of 17 per cent., less tax, on the Ordinary shares and 5¾ per cent., less tax, on Preference shares, making 27 per cent. and 9¾ per cent. (both same), have been declared, and £157 added to the carry-forward.

The actual value of the investments still exceeds the book value. The company has invested nearly £150,000 in Government stocks and at the present time a further sum of £86,000 has been placed to tax reserve certificates or lent to H.M. Treasury without interest to provide for future taxation liabilities. Out of each £1 profit earned during the year 17s. will be paid by the company in taxation.

Investments at cost less depreciation total £317,290 (£184,871). Valuation at December 31 in excess of book values. Debtors amount to £100,839 (£110,627), stocks to £88,548 (£74,940), and cash to £78,022 (£98,631). Creditors are £21,612 (£27,471) and taxation £164,703 (£58,000). Mr. H. O. Barratt is chairman.

* * *

Flow Indicator

An improved type of visible flow indicator has been recently announced. The flow indicator is primarily intended for use on pressure lubricating lines, water-cooling lines, cooling coils, etc., on turbines, marine engines, compressors, gear trains and internal-combustion engines, but its application is of value wherever a flow of oil or water is to be maintained, particularly in closed circuits or as a "tell-tale" indication on overflows from tanks, etc.

The Flow Indicator is simple in construction and operation and there is only one moving part, the steel spindle. A heavy bronze body contains a cast propeller on a stainless steel spindle; on the other end of the spindle is mounted the flag—a chequered disc. The flag is enclosed in a dome of specially toughened glass (tested hydraulically to over 500 lb.). Oil or water as it passes spins the disc and so gives a visible indication that the flow is not interrupted, as would be the case if the disc became stationary. It is made in standard sizes of ½ in., ¾ in., 1 in. and 2 in. Larger sizes, however, can be made to order, or alternatively a by-pass can be used. The indicator is suitable for operating at pressures up to 50 lb. per sq. in.

The whole arrangement is the simplest method of seeing at a glance whether liquids are flowing in pipelines. Its name is the Arkon Flow Indicator and it is made by Walker, Crosweller and Co., Ltd.

* * *

Spirax Manufacturing Co. and Walker, Crosweller & Co.

Prior to May, 1939, all matters concerning the marketing of Spirax Steam Traps and other Spirax products were in the hands of Messrs. Walker, Crosweller and Co., Ltd. Since that date all these products have been manufactured and marketed solely by Spirax Manufacturing Co., Ltd.

Although the two firms have now not the slightest connection with each other, Messrs. Walker, Crosweller and Co., Ltd., occasionally receive orders for Spirax Steam Traps, which have to be readdressed to Spirax Manufacturing Co., Ltd., and they, in turn, sometimes receive orders for Leonard Thermostatic Mixing Valves which have to be readdressed to Walker, Crosweller and Co., Ltd. Naturally this causes unnecessary delay at both places in completing the orders.

* * *

Correction

The picture in FOOD MANUFACTURE, April, page 91, column 1, which illustrated one of the control instruments of Elliott Brothers (London), Ltd., should have been described as "Portable Thermocouple Potentiometer" and not as their "Weameter Test Set" which is a different instrument.

Information and Advice

Cold Mix Ice Cream

7,573. *As subscribers to your magazine, we shall be much obliged if you could supply us with a recipe for the making up of an ice cream powder (cold mix) to be prepared from materials presently available and uncontrolled.* (Bishopbriggs.)

The only alternative to a milk powder ice cream powder would be a hot mix one, the main base of which would be starch, or a combination of several starches, supplemented by such materials as dried egg yolk or whole egg or a mixture of both, soya bean flour, etc.

Your only possible alternative to a powder of this hot-water type would be a powder which would give a simple water ice. This would consist of sugar, a sugar substitute, citric or tartaric acid, stabiliser and fruit flavouring (powdered material). If you have insufficient sugar to serve the purpose, then there is nothing to be done in the way of a powdered water ice mix.

Tonic Wines

7,577. *We would be obliged if you could recommend us any special book, literature or publication about "Tonic Wines."* (Newcastle-on-Tyne.)

The following books may prove useful:

Manual for the Essence Industry, by Erich Walter, 1933, pp. 429, 25s.

Its sub-title reads: Comprising the most modern methods for making all kinds of essences for fruit juices, fruit wines, and jams, also manufacturing mineral waters; essences of fruits and other vegetables, raw materials, fancy lemonades of every kind, essences for confectionery, pastry and the kitchen; manufacturing colours and perfumes with a full description of raw materials and of laboratory practice. With an additional part on the essences for liquors, brandies, liqueurs and all alcoholic drinks.

Flavours and Essences—A Handbook of Formulæ by M. H. Gazan, 1936, 28s.

Gives over 310 formulæ, interleaved for note-making.

Chemistry and Technology of Wines and Liquors, by K. M. Herstein and T. C. Gregory, 1937, 2nd edition, 360 pp. 35s.

Contents: Sugars and starches, enzymes, fermentation, raw materials, yeasts and other organisms. Production of yeast, malt, distillation, whisky manufacture, brandy, rum, gin, applejack and minor distilled liquors, wines, champagne and cider, liqueurs and cordials, analysis of alcoholic beverages. Interpretation and methods. Analytical reference tables. Statistics of the liquor industry. Selected bibliography.

In Cruess's *Commercial Fruit and Vegetable Products* is contained a complete chapter on wines of some 60 odd pages.

Information Required

7,484. *In the February 1, 1941, issue of* FOOD MANUFACTURE, *I noticed the following paragraph in the article "Canning in Ulster" on page 30:*

"Heat penetration tests, using the well-known Foster thermocouples, are periodically carried out to ascertain if changes in weather conditions, etc., necessitate longer processing time."

My work deals with the processing of food and I am anxious to know more about the Foster thermocouple, and also the relationship of weather conditions to processing time. (U.S.A.)

Details were given.

7,493. *We have received an enquiry from clients in East Africa for electrically-operated machinery for the manufacture of vermicelli on a moderately small scale.*

It would be very much appreciated if you could give us the names and addresses of manufacturers of this type of machinery. (London.)

This was done.

7,500. *I should be greatly obliged if you could let me have a recipe for making macaroni.* (London.)

This was given.

7,501. *A reference is made on page 113 of the May 2, 1941, vol. xvi, No. 5, of* FOOD MANUFACTURE *in an article on "Boiler Fuel Economy" regarding the B.B.A. system of Thermal Storage.*

We would be very grateful if you could put us in touch with the firm handling this system. (Limerick.)

This was done.

7,505. *We received a complaint from one of our customers that a recent consignment contains a very high percentage (7 per cent.) blown tins.*

The consignment was stored on the premises which were destroyed in a recent air raid and afterwards salvaged. The goods were packed in rectangular tins, 12 tins to the case.

We have been manufacturing these goods for a number of years and no similar case has been reported, nor have we had any complaints from customers in the same town supplied with these goods.

We are therefore of the opinion that this defect is due to bomb blast and would deem it a favour if you could give us any further information on the matter. (Dublin.)

Although there seems a possibility that bomb blast might produce leaks leading to blown tins, it is quite impossible for us to express an opinion. As this information and advice service does not include the examination of samples, we would suggest that you send some sample tins to an expert for report.

7,510. *With reference to recent article on the use of Potato Flour, we shall be glad if you can let us have the names of suppliers of this product, as we are anxious to obtain supplies.* (Smethwick.)

This was done.

7,515. *Could you please tell me who are the makers of the machine that cuts glazed paper into pieces of about 2 inches square? It is set on a revolving platform and the various punches operate to fill these pieces of paper with salt.* (Bristol.)

This was done.

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Process for Treating Nuts to Soften the Shells

The primary object of this invention is the provision of a treatment process for rendering easily frangible the shells of hard, woody-shelled nuts, without affecting the qualities of the nut meats, and without great expense.

The process is of general application to all types of nuts; but it is described in connection with Brazil nuts. The Brazil nut has a very hard and woody shell which not only is exceedingly difficult to crack, but which cannot usually be cracked in such a way as to leave the kernel whole.

Brazil nuts are thus made available in confectionery and other arts where hitherto their use has been restricted.

The nuts are subjected to the action of aluminium chloride, ferric chloride, antimony pentachloride, sulphur monochloride, thionyl chloride, phosphorus pentachloride or phosphorus trichloride, while controlling the reaction to prevent attack of the kernels of said nuts.

The Brazil nuts are dried at 75° to 80° C. with air circulation.

The nuts are then treated with anhydrous aluminium chloride in a rotating drum. One lb. of anhydrous aluminium chloride to 10 lb. of nuts is a satisfactory proportion for a treatment period of twenty-four hours.

The nuts are then placed in a bath of water and allowed to soak to extract any aluminium salt and most of any acid present.

The next step is to wash and soak the nuts in a very dilute solution of sodium carbonate.

After the neutralisation, the nuts are dried in a suitable drier until their moisture content is in the neighbourhood of their original moisture content or less. The lower the moisture content the better the keeping qualities of the nuts. Again the drying should be at a relatively low temperature, say 75° or 80° C., with air circulation, and should not be so protracted as to affect the kernels.

The result of the process as described is an action on the shells whereby the shells become friable and may be crushed and broken very easily. There is a slight lightening of colour, an increased porosity, and in many instances the shells appear to develop a network of fine cracks. Larger cracks occasionally appear in the shells. The action is confined to the shells, however, and the kernels are not affected either as to appearance, wholesomeness or flavour. There is no significant amount of residual aluminium compounds. The shells when tested after treatment actually show less aluminium than before treatment; and the quantity of aluminium in the kernels is so small as to render testing difficult, and is well below the established permissible quantity of aluminium in food products.

542,381. Charles Henry Frazier.

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

542,216. United States Rubber Co.: Anti-oxidants.

542,244. Bee Bee Biscuits, Ltd., and Buxbaum, E. K.: Method of and apparatus for manufacturing open containers made of pliable sheet material.

542,261. Robinson, Ltd., E. S. and A., Robinson, H. G., and Dufty, S.: Boxes, cartons, and the like.

542,269. Raolin Corporation: Manufacture of closures and liners for containers.

542,306. Robinson Bros. Cork Growers, Ltd., and Fox, F.: Process for the manufacture of stoppers for bottles and similar containers.

542,316. Lederle Laboratories, Inc.: Vitamin B complex.

542,333. Bouly, H. G. (Aktiebolaget Overums Bruk.): Machines for harvesting root crops.

542,377. Metal Closures, Ltd., and Finlayson, W. B.: Apparatus for fixing closures on to bottles and like containers.

542,378. Crown Cork and Seal Co., Inc.: Machines for filling bottles and like containers.

542,381. Frazier, C. H.: Process for treating nuts to soften the shells.

542,456. British Thomson-Houston Co., Ltd.: Food storage receptacle for refrigerators.

542,457. British Thomson-Houston Co., Ltd.: Freezing-trays.

542,461. Igranic Electric Co., Ltd., and Taylor, J. R.: Electric timing devices.

542,504. Riley, G. W., and Scott and Son (London), Ltd., G.: Processes and apparatus for conditioning wheat and like grain.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

WITAMAID.—616,239. Preserved, dried or cooked fruits, dried lentils, split peas, dried haricot beans, butter beans and preserved, canned or dried peas. **T. W. Good and Son, Ltd.,** 94 and 95, Witham, Kingston-upon-Hull; Wholesale Grocers and Provision Merchants. To be Associated with No. 615,632 (3324) xxx and others.

WITAMAID.—616,240. Fresh lentils, fresh haricot and butter beans, fresh green peas, barley, maize and oats. **T. W. Good and Son, Ltd.,** 94 and 95, Witham, Kingston-upon-Hull, Wholesale Grocers and Provision Merchants. To be Associated with No. 615,632 (3324) xxx and others.

JARVAL.—616,376. Bottled, canned and preserved fish, fruits, meats and vegetables; meat and vegetable extracts; jellies (for food), jelly powders and jams; eggs; liquid and dried eggs; edible oils and fats; milk powders and fruit preserves and pickles. **Jean Robert Valois,** 6 and 7, St. Dunstan's Lane, Eastcheap, London, E.C. 3; Merchant.

New Companies

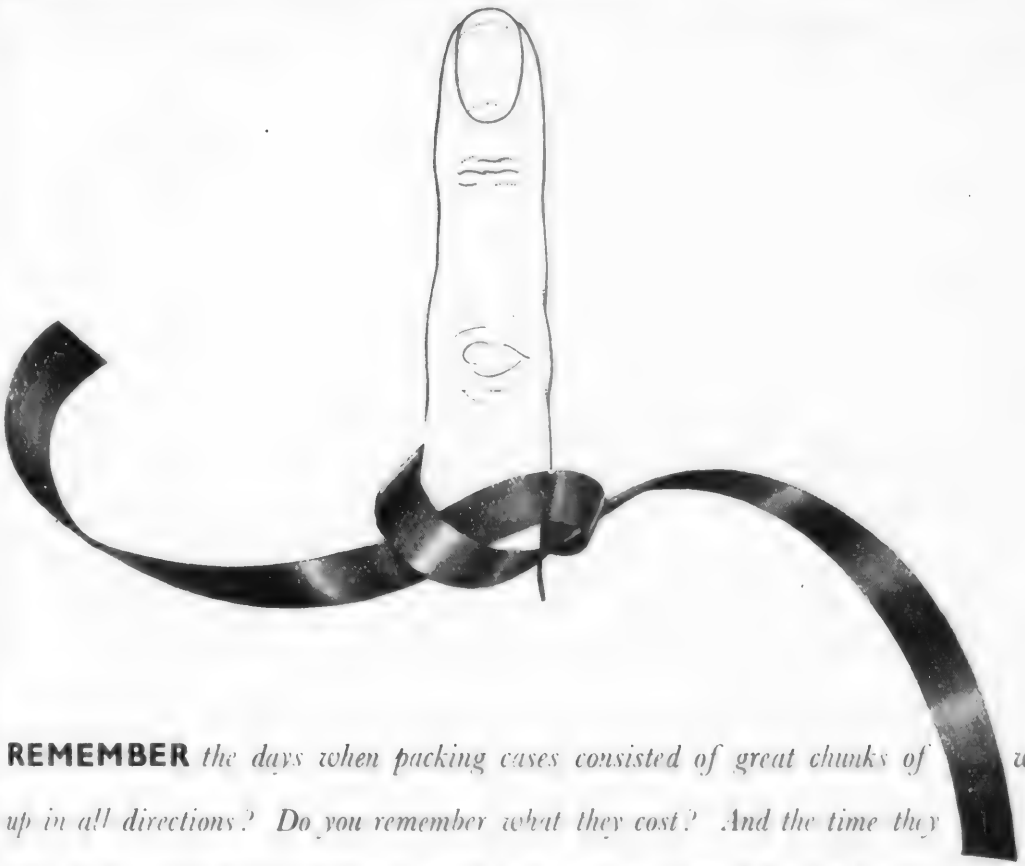
T. S. Simpson, Limited. (371449.) Mnfrs. of and dlrs. in chocolate, confectionery, provisions and refreshments, etc. £4,000. Permt. dirs.: T. S. Simpson, 4, Cotneer Road, Oulton Broad, Lowestoft; Foisinia Maud Simpson, address not stated. Sub.: Edith M. Pearse, 24, Ipswich Road, Lowestoft.

Splendide Canned Supplies, Limited. (371533.) 6, Holborn Viaduct, E.C. £1,000. Dirs.: B. A. Thompson, Old Manor House, Wormley, Herts.; A. E. Thomson, Almeria, Athenæum Road, N. 20; A. W. Thompson, 90, Great Bushey Drive, N. 20.

Superlae Flour Company, Limited. (371535.) To acquire the trade mark "Superise", and to carry on the bus. of millers, etc. £100. Dirs.: W. D. Brown, 29, London Road, Maldon, Essex; E. T. Baker, New Trees, Maldon, Essex.

H. Gordon and Co (Hull), Limited. (371618.) 588, Hessle Road, Hull. To take over the bus. of fish cake cnfrs. cd. on as "H. Gordon and Co." at Hull. £500. Permt. dirs.: E. G. Nicholson, H. G. Nicholson, both of 732, Hessle Road, Hull.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.



REMEMBER *the days when packing cases consisted of great chunks of wood nailed up in all directions? Do you remember what they cost? And the time they took to seal up! And the job it was to open them? But they made grand firewood once they* ***were*** *opened! Seal-Less has changed* ***tout cela*** *(as we like to put it in our highly educated way). Cases can be lighter yet stronger; they can be easily closed and opened without damage. They take the blows and buffets of the journey better and come back ready for more work. Now a fresh problem. Present-day circumstances have literally altered cases. Flimsy cartons have to do the work of boxes. These cartons must be reinforced; they must be effectively sealed against pilferers yet easily opened without damage. They* ***must*** *be returned for further use. Seal-Less can do* ***tout cela*** *(look it up—we did). There is a special type of Seal-Less Carton Strapping that will "bring 'em back," very much alive.*

SEAL-LESS STRAPPING LTD., 19 SOUTHWARK STREET, LONDON, S.E.1: TELEPHONE HOP 1661-2

BREHMER'S

CONTAINER WIRE-STITCHER, No. 57½

This machine serves for wire stitching the bottoms of single piece corrugated or solid board containers. The pillar type Anvil has 30-in. maximum reach and suffices for firmly fastening the bottom flaps with wire stitches automatically formed, driven and clinched from a reel of Ribbon Stitching Wire 12 by 25 or 12 by 26 gauge. An interchangeable top stitching tongue with adjustable work-table can also be supplied for wire stitching, also the tops of the filled containers in place of taping. Supplied in three styles, viz.: For Treadle use, Line-shaft drive, or self-contained direct motor drive. Speed to 150 stitches per minute.

PARTICULARS OF THIS AND OTHER BRITISH-MADE BREHMER WIRE-STITCHERS on application to:

AUG. BREHMER'S (BRITISH) SUCCESSOR LTD.

Offices:

Batchworth House, Harefield Road, Rickmansworth, Herts

Telephone and Telegrams: Rickmansworth 3413

Science stops mice meeting

Two or three mice on your premises may soon present you with the problem of dealing with thousands. The successful scientific methods employed by the British Ratin Company in the war against rats throughout the country can be used with equal success effectively to deal with this ever-growing menace.

The service offered by the British Ratin Company is the outcome of years of patient study of the whole problem of vermin infestation, and is harmless to domestic animals and birds.

The British Ratin Company has no preparation for sale to the general public; it offers a service only.

Fill in the coupon and the Ratin Company's local surveyor will call and give you an estimate for dealing with your infestation.

The Ratin Service is available anywhere in Great Britain and Ireland.

The Service also deals effectively with beetles, cockroaches, and other insect pests.

RATIN SERVICE

First ALLAYS Suspicion - then DESTROYS Rats

To THE BRITISH RATIN CO., LTD., 58, Kingsway Corner Buildings, London, W.C.2 Tel.: HOLborn 0401

Please ask your Surveyor to call and explain how the Ratin Service (preparation not supplied) deals with rats, mice and insect pests

Name .....

Address .....

Date of application ..... *Time* .....

pH METER TF. 717

The model here illustrated is suitable for operation from A.C. Mains, and employs our standard Glass Electrode System. Can be used either for Works Process Control or Research Work in the Laboratory.

Range	- -	0-14 pH
Accuracy	- -	±0·02 pH

MARCONI INSTRUMENTS LTD., ST. ALBANS, HERTS. Tel.: 4323

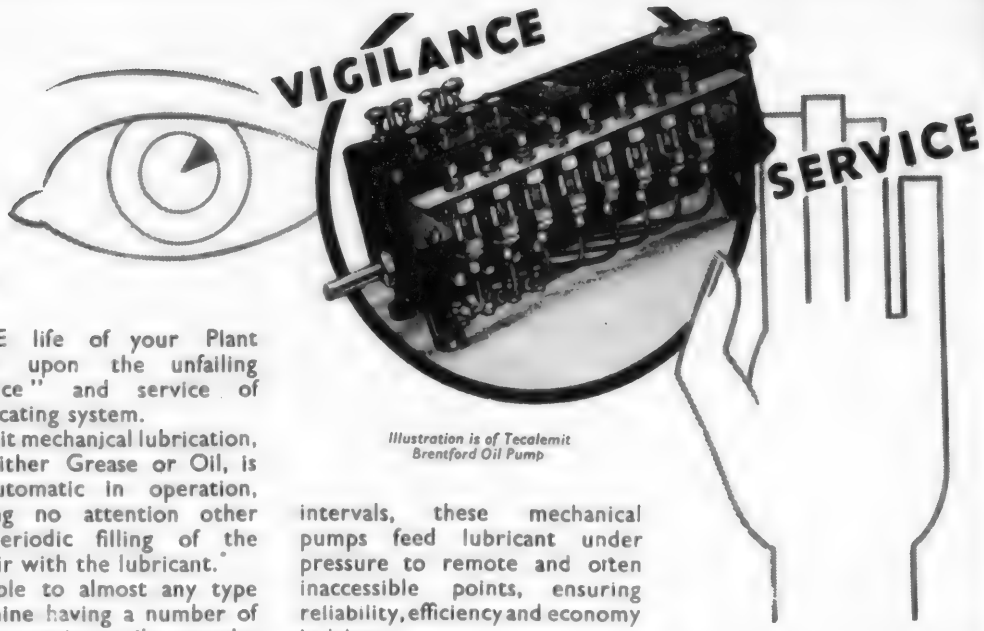
WE HAVE TO MAKE CUTS

in the quantity of Elpex Apple Pectin that can be delivered within some periods—but at no time is the importance of keeping our customers' production to schedule lost sight of.

For years we have produced THE Pectin that can be depended upon not to vary—and we are not departing from this standard now.

As always—Elpex Apple Pectin is your "setting" safeguard—and we are doing everything man can do to see that production is kept as near demand as possible.

WM. EVANS & CO. (Hereford & Devon) **LTD.**
20, WIDEMARSH, HEREFORD. Est. 1850

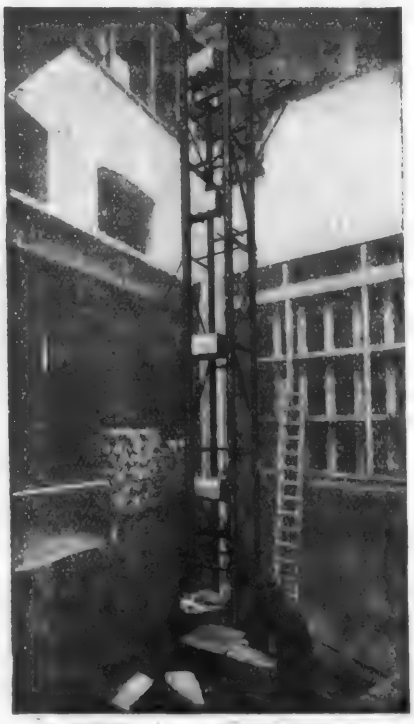


THE life of your Plant depends upon the unfailing "vigilance" and service of its lubricating system.
Tecalemit mechanical lubrication, using either Grease or Oil, is fully automatic in operation, requiring no attention other than periodic filling of the reservoir with the lubricant.
Applicable to almost any type of machine having a number of bearings requiring oil at regular intervals, these mechanical pumps feed lubricant under pressure to remote and often inaccessible points, ensuring reliability, efficiency and economy in labour.

Illustration is of Tecalemit Brentford Oil Pump

MECHANICAL LUBRICATION *by* **TECALEMIT**

TECALEMIT LIMITED . GREAT WEST ROAD . BRENTFORD . MIDDLESEX . EALING 6661 (12 lines)



Swing Tray Elevator for Handling Boxes, Sacks, Bales, etc.

Telephone: Gulliver 4418/9
Telegrams: "Rownson, Cent, London"

LABOUR AIDING MACHINERY
BAND CONVEYORS
GRAVITY CONVEYORS
ELEVATORS
PORTABLE PILERS
PLATFORM HOISTS

We are actual Manufacturers

ROWNSON, DREW & CLYDESDALE, LTD.
225 UPPER THAMES STREET, E.C.4

Works: MAIDEN LANE, KING'S CROSS, N.7

EXPERIENCE DOES COUNT

For over a hundred years we have been making Enamelled Plant for all purposes. Much research and experimental work is carried out in the design of equipment for modern requirements.

T. & C. CLARK & CO. LTD.
WOLVERHAMPTON

"It's the Lining that counts!"

"RED BALL" BRAND

Essences, Essential Oils, Colours.

For Aerated Waters, Confectionery, and the Food Manufacturing Industries.

STEVENSON & HOWELL LIMITED
STANDARD WORKS, SOUTHWARK STREET, LONDON, S.E.1
Telephone: Waterloo 4811 (8 lines) Established 1881 Telegrams: "Distiller, Telex, London"

BRITISH
LECITHIN

IF you are interested please
apply for particulars to:

Fredk. BOEHM Ltd.

Rowanhurst, Grove Road, BEACONSFIELD
Bucks.

Telephone : Beaconsfield 378

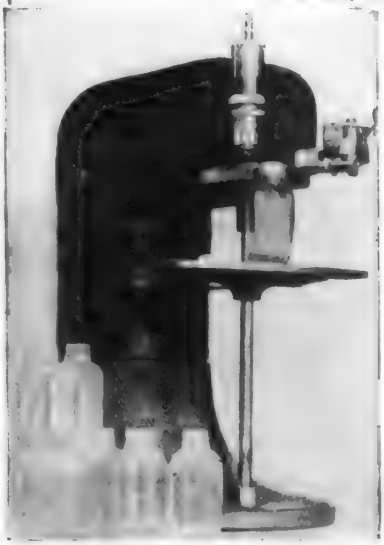
'HYGIENIC'

MACHINE for—COUNTING and FILLING

Tablets, pills (coated or uncoated), seeds, metal or bakelite parts.

Output up to 1,000,000 per day.

One operator. 1/30 H.P. Motor.



'AUTOMATC'

'AUTOMATIC'

MACHINE for
SCREWING & TIGHTENING

Caps on to bottles of any size or shape.

Output 25,000 per day.

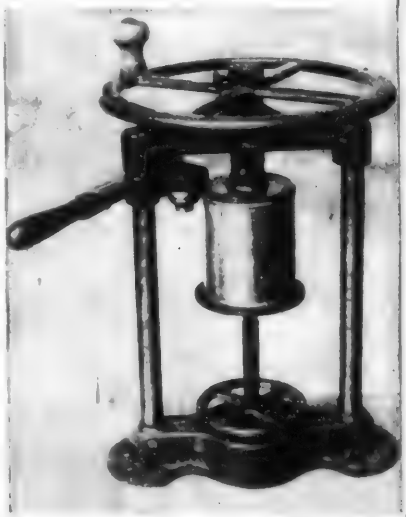
One operator. ½ H.P. Motor.

'ECONOM'

DOUBLE SEAMING MACHINE

(with or without Trimming and Flanging Attachment) readily adjustable for various sizes, main Spindle on Ball Bearings, tight and close Double-Seaming.

Output 50-100 per hour.



'ECONOM'

RICHARD BRANDT

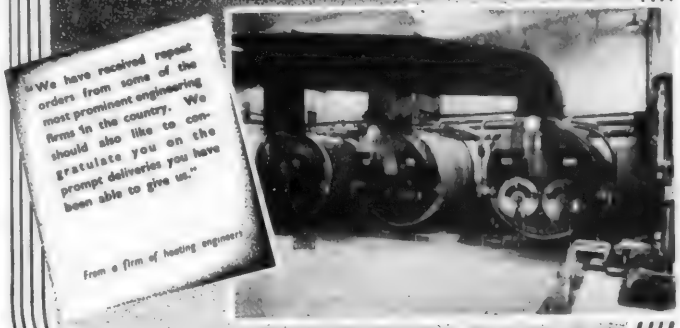
AUTOMATIC

MACHINES

27 PERCY STREET, TOTTENHAM COURT ROAD, LONDON, W.1. Tel.: Museum 1303

ROBEY RELIABILITY

... and one of the reasons for it


"We have received repeat orders from some of the most prominent engineering firms in the country. We should also like to congratulate you on the prompt deliveries you have been able to give us."
From a firm of heating engineers

ROBEY ECONOMIC BOILER

Why are Robey Economic Boilers widely used in commercial and industrial concerns to-day? Because when you install a Robey Boiler you install reliability—the reliability built into all Robey products.

Here are the main features of the Economic Boiler—features well known to all its users, and features that are quickly proved with every new installation :

RAPID STEAM GENERATING CAPACITY · LARGE HEATING SURFACE · HIGH EVAPORATIVE DUTY · ECONOMY IN FUEL · HIGH EFFICIENCY · COMPACTNESS

Three Robey Economic Boilers arranged for oil firing with Urquhart Oil Burning apparatus. Supplied through the Aluminium Plant and Vessel Co. Ltd., to the Bristol Co-operative Society Dairy, Bristlington.

ROBEY OF LINCOLN

ROBEY & CO. LTD. • LINCOLN

London Office: 37-38 Fenchurch Street, E.C.3

ADHESIVES

FOR ALL TYPES OF FOOD PACKING BY HAND OR MACHINE. SAMPLES OR ADVICE WILLINGLY SENT ON APPLICATION.

ADHESIVES FOR THE CANNING INDUSTRY A SPECIALITY

GLOY & EMPIRE ADHESIVES LTD.

ACME WORKS · CLAPTON · LONDON, E. 5

TELEPHONE: AMHerst 4746 (4 lines)

AUSTRALIA: J. DAVIES & SONS, 20 SOUTH AUDLEY STREET, ABBOTSFORD, N. 9, VICTORIA

USE ONLY VITA - Natcherlyk

THE IDEAL BURST-PROOF

WEAZAND & BUNG

The Savings of Fat and Meat as against Animal Casings in the boiling & smoke are greater than the costs of the VITA-Natcherlyk

BRAINOS & CO., 42a TARN ST., LONDON, S.E.1

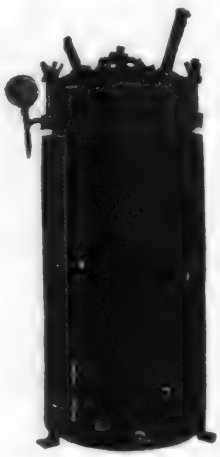
C.W.O. Telephone: HOP 3932

GAS-HEATED RETORT & BOILER COMBINED

Experimental size for

MEAT
FISH
FRUIT
VEGETABLES

NO STEAM PIPE CONNECTIONS



"MILLWALL"

PRODUCTION BY

JOHN FRASER & SON, LTD.

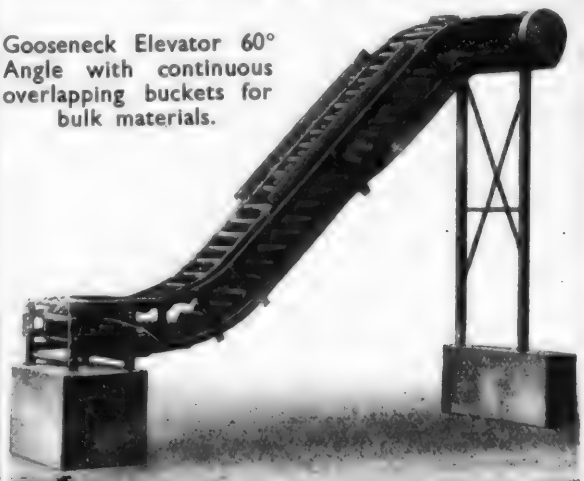
ENGINEERS AND BOILER MAKERS

MILLWALL, LONDON, E. 14 *Phone:* EAST 1185 (Private Branch Exchange)

G.C.

ELEVATORS *and* CONVEYORS

Gooseneck Elevator 60° Angle with continuous overlapping buckets for bulk materials.



G. C. ENGINEERING Co LTD

(ASSOCIATED WITH FREDK. BRABY & Co., Ltd.)

GRINSTEAD RD., DEPTFORD, LONDON, S.E. 8

TIDEWAY 1234

DUROMA ESSENCES

FOR ALL FOOD PRODUCTS

DUROMA PRODUCTS

SALES OFFICE: BREWHOUSE BANK, NORTH SHIELDS
LABORATORIES & WORKS:
DUBUIS & BOWESS LTD., 'DUROMA' WORKS, CROYDON

WHY DOES A MILLER

WEAR A WHITE

(AS LYMM-PURE-SALT) **HAT?**

It is not in the public interest in wartime to answer such a question, but it is in the public interest to say that you can see the whiteness of Lymm-Pure-Salt. You cannot see its purity. That's why it is important to look for the Guarantee—99.98% pure—on every invoice for salt.

LYMM · PURE · SALT

SNOWDROP BRAND

Guaranteed 99.98% pure

SIGNED GUARANTEE OF PURITY

"WE Guarantee our 'LYMM-PURE-SALT' to be absolutely Pure Salt, containing 99.98% Sodium Chloride on dry sample. It contains no SULPHATE OF LIME (Plaster of Paris), Sulphate of Magnesia, Chloride of Magnesia, Chloride of Barium. SULPHATE OF SODA or any adulteration."

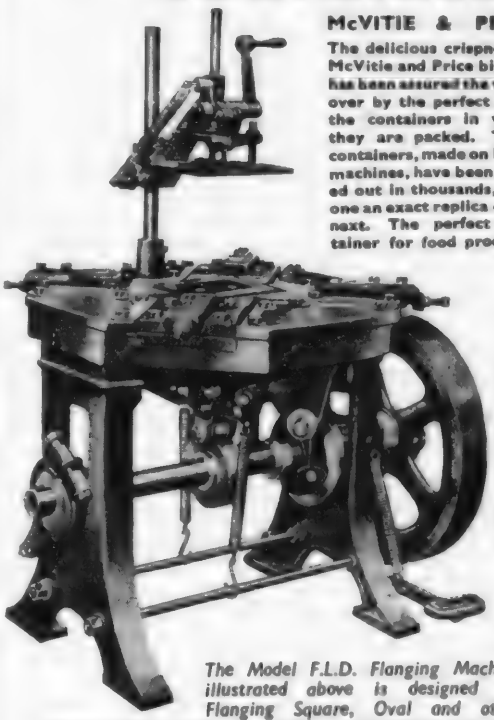
Charles Moore & Co. Ltd.

Charles Moore & Co. Ltd. Lymm, Cheshire. All enquiries to Sales Managers —Honeywill & Stein Ltd. Wartime Address: Great Burgh, Epsom, Surrey.

Famous CONTAINERS

McVITIE & PRICE

The delicious crispness of McVitie and Price biscuits has been assured the world over by the perfect fit of the containers in which they are packed. These containers, made on Moon machines, have been turned out in thousands, each one an exact replica of the next. The perfect container for food products.



The Model F.L.D. Flanging Machine illustrated above is designed for Flanging Square, Oval and other Irregular-shaped Bodies in readiness for double seaming.

The flanging motion is unique and independent of the automatic slide movement, occurring only after the body has been trued to shape and gripped, it produces a perfectly level flange with a complete absence of "pips" at the side joints.

The machines are treadle operated through a non-repeat, dual-sprung, rocking key clutch, and are safe and easy to work.

Change-over from size to size is simple and speedy, as every set of tools supplied are fitted with adjusting plates giving instant location.

Made on Machines by

MOON

MOON BROTHERS LIMITED, BEAUFORT ROAD, BIRKENHEAD

Makers of Tin Box and Drum-Making Machinery

ALL ENQUIRIES TO:—

CONTAINS NO EGGS

BRITISH FERMENTATION PRODUCTS LTD. - - Chieftain Works, LONDON, S.W.15
(Ipswich and Depots covering the country)

Sole Agents for Scotland:—
TEXTOL LIMITED, Scottish Industrial Estate, Carlyle Avenue, Hillington, GLASGOW, S.W.2

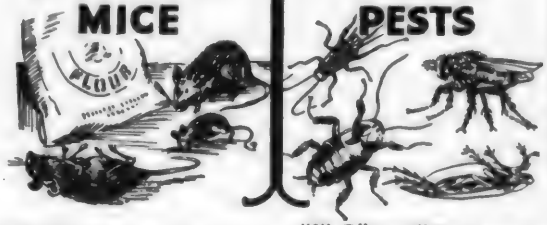
'SKAT'

RAT PASTE Y INSECT KILLER

means

DEATH! to RATS AND MICE

DEATH! to INSECT PESTS



"SKAT" Rat Paste offers sure protection against the ravages of rats and mice. Non-poisonous. Prices: 1/6, 2/6, 5/- each.

"SKAT" Insect Killer is unrivalled for destroying Silver or Steam Flies, Beetles, Crickets, Cockroaches, etc. 1-lb. cartons from 5/- each. Liquid, 2-pint can 5/- each.

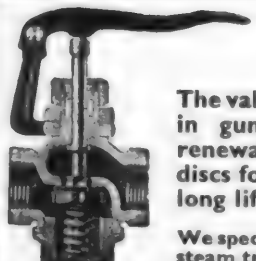
and protection to the NATION'S VITAL FOOD STOCKS!

Blackwell Hayes & Co., Ltd., Manufacturing Chemists
54-58, Moor Street, BIRMINGHAM 4

VALVES

FOR STEAM AND WATER SUPPLIES— QUICK AND EASY TO OPERATE

No. 70



No. 76

The valves are heavily made in gunmetal, fitted with renewable composition discs for any service, giving long life with low cost.

We specialise in reducing valves, steam traps, and control valves for any duty.

BRITISH STEAM SPECIALTIES LTD.
FLEET STREET, LEICESTER

Gum Karaya

GUM TRAGACANTH
GUM BENZOIN
MANILA COPAL
(POWDERED AND WHOLE)

DIRECT IMPORTERS:

M. HAMBURGER & SONS

Telephone: Bookham 2746-2748
Telegrams: Homacion, Bookham

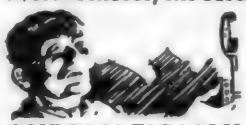
THE HAWTHORNS
LEATHERHEAD RD.
GT. BOOKHAM
SURREY

Cautionary Tales No. 6

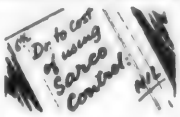
A NAIL in HIS coffin!

Before our FIGHTERS can make their SWEEPS over occupied France, before our

BOMBERS can load up to RAID the Ruhr, every one of their engines has flown HUNDREDS of miles on the test bench. In this VITAL work SARCO is playing its part. In place of a skilled operator who would have to stand by continuously, his EYES on a thermometer, his HAND on a valve, constantly



making adjustments, Sarco Control does this AUTOMATICALLY. Without attention, with NONE of the time lag INEVITABLE with manual control, SARCO maintains CONSTANT temperatures with NO possibility of error. It costs



NO more than two or three weeks wages to acquire SARCO control. After that it works for NOTHING . . . and the skilled man can turn his hand to other important work.

Have you a heat control problem?
Write to Dept. 12F.

SARCO
TEMPERATURE CONTROL

SARCO THERMOSTATS LTD. Alpha House, Cheltenham, Glos.

Manufacturers of :—

FLAVOURS

for

Confectionery and Foodstuffs

Distillers of :—

TERPENELESS

OILS

ETC.,

ETC.

SŌFLOR, LIMITED

WADSWORTH RD., PERIVALE, GREENFORD, MIDDLESEX

PHONE : PERivale 1172-3

PACKAGING PROBLEMS

If cartons and outers—or ingenious adaptations of them—might solve yours, perhaps we can help you

WILLIAM W.

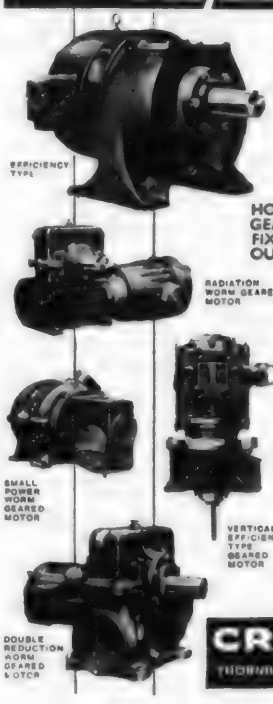
CLELAND

LIMITED

Chansitor House, Chancery Lane, LONDON, W.C. 2

AND CULLINGTREE FACTORY BELFAST

CROFTS "Enispeed" GEARED MOTORS


EFFICIENCY TYPE
RADIATION WORM GEARED MOTOR
SMALL POWER WORM GEARED MOTOR
VERTICAL EFFICIENCY TYPE GEARED MOTOR
DOUBLE REDUCTION WORM GEARED MOTOR

for the Efficient Driving of all classes of Machinery Conveyors, etc.

HORSE-POWERS UP TO 150 H.P. GEAR RATIOS UP TO 50,000/1. FIXED OR MULTIPLE SPEED OUTPUT SHAFTS.

We have the widest range of Standardised Geared Motor Units in Designs and Sizes to meet all general industrial requirements.

Output Shafts any angle-Horizontal to Vertical—Units can be Floor, Wall, Ceiling or Flange Mounted

Our NEW CATALOGUE E240 now available. Most comprehensive yet issued on Geared Motor Design and Application. Copies on Request.

CROFTS (ENGINEERS) LTD
THORNBURY BRADFORD ENGLAND

"Permac" joint on a Manhole Boiler Cover in the Works of a Food Manufacturer

Recommended at the Nations' Food Exhibition

"Permac" joints on a Jacketed Pan

"Permac," the original metal-to-metal jointing, is recommended for use in the manufacture of food.

"Permac" makes leak-proof joints which last till you want to break them down. Guaranteed non-poisonous. Send for particulars.

Permac
METAL-TO-METAL JOINTING MATERIAL.

Manufactured only by

THOMAS & BISHOP LTD.

(Formerly of 37, Tabernacle Street, London, E.C.2)

Temporary Address : **39 Arthur Road, Wimbledon Park, London, S.W. 19**
Telephone : WIMbledon 1781. Telegrams : "Veicling," Wimble, London
"Cling-Surface" for Belts and Ropes is another of our high-grade specialities

CORKS

for the

FOOD MANUFACTURER

GOOD STOCKS PROMPT DELIVERY

LEONARD DUTTON & SONS

110 and 112, HACKNEY ROAD, E.2

'Grams : "CORKTREE," Phone, London.
Telephone : Bishopsgate 4467 (2 lines).

STURTEVANT

Registered

AIR CONDITIONING PLANT FOR FOOD FACTORIES

Atmospheric conditions can adversely affect the quality of a food. With Sturtevant Plant complete control of conditions can be maintained so that materials may be handled to the best advantage and spoilage reduced to the minimum. Also there is considerable benefit to workers—greater vitality in mind and body resulting in less loss of time due to sickness Sturtevant Air Conditioning equipment is operating with success in all kinds of food factories. **Some particulars of such plant are given in our post-free booklet W1382.**

STURTEVANT ENGINEERING CO. LTD.

25 WORCESTER RD., SUTTON, SURREY

GELATINES

OF ALL KINDS

IMPORTERS & DEALERS IN

ALMONDS (Bags & Boxes)	DESICCATED COCOANUT	GLACÉ CHERRIES
WALNUTS	AGAR-AGAR	TARTARIC ACID
BRAZILS (Shelled)	GUM ARABIC	CITRIC ACID
HAZELNUTS	GINGER (Wet & Dry)	FARINA
PEANUTS	COCOA BUTTER	SAGO FLOUR (& Diffused)
	ALBUMEN	MAIZE FLAKES
		SUGAR CANDY, Etc.

FOUNDED IN 1857

T. M. DUCHÉ & SONS [U.K] LTD

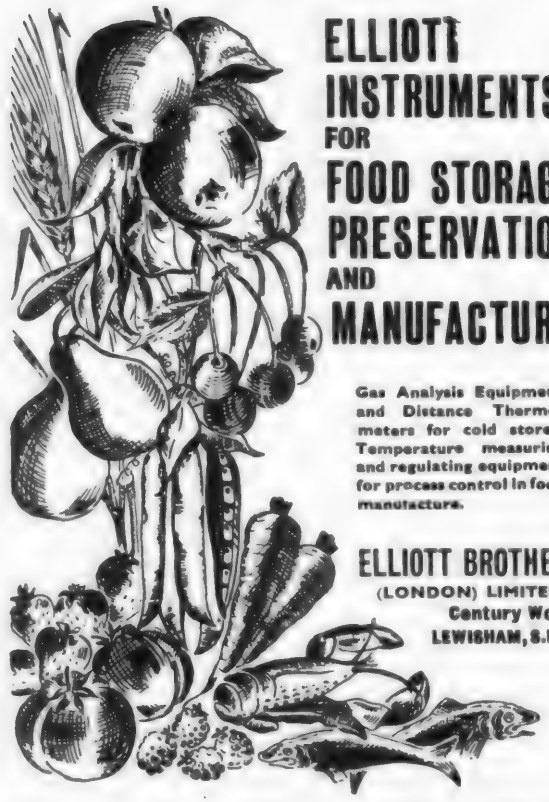
Telephone: Mansion House 7681 (3 lines)

Telegrams: "Duché, London"

ADELAIDE HOUSE, LONDON BRIDGE, LONDON, E.C. 4

BRANCHES AT

MANCHESTER: 5 Marsden St. *Tel.:* Blackfriars 4862 (2 lines). **GLASGOW:** 28 Cadogan St. *Tel.:* Central 6498 (2 lines)



ELLIOTT INSTRUMENTS FOR FOOD STORAGE PRESERVATION AND MANUFACTURE

Gas Analysis Equipment and Distance Thermometers for cold stores. Temperature measuring and regulating equipment for process control in food manufacture.

ELLIOTT BROTHERS
(LONDON) LIMITED
Century Works
LEWISHAM, S.E. 13

DRIED YEAST

Produced from the celebrated D.C.L. Pure Culture Yeast, and obtainable in the following grades:

For **Fermentation** or **Baking** purposes.

For **Medicinal** use, in ground or powdered form.

DRIED MALT EXTRACT

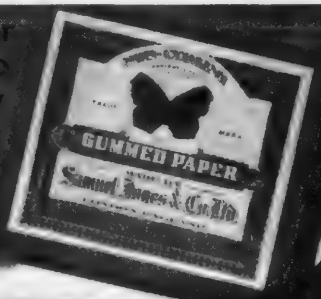
A kindred product to the world-renowned D.C.L. Malt Extract, which can be obtained in various qualities to meet customers' requirements.

SAMPLES AND PRICES MAY BE OBTAINED FROM

THE DISTILLERS COMPANY LTD.
12 Torphichen Street, Edinburgh *or*

The UNITED YEAST COMPANY, Ltd.
London, Bristol, Birmingham, Manchester, Leeds, & Newcastle

Help your country to Victory by restricting the use of paper to essential purposes



★— but remember
BUTTERFLY BRAND
GUMMED AND COATED PAPERS
now—
and after Victory

SAMUEL JONES & Co. Ltd
16-17 NEW BRIDGE STREET, E.C.4. 'Phone: CENtral 6500

EVERTAUT LIMITED

Steel STACKING CHAIRS & CANTEEN TABLES

Besides the Factory Inspector's insistence on adequate canteen accommodation, prolonged work on Government contracts makes it necessary for workers—factory and office—to take their rest periods and eat their meals in properly equipped surroundings. Efficient, strong and hygienic tables and chairs contribute largely to the workers' welfare. If you are engaged on War Work and your canteen furniture is incomplete, send for descriptive leaflet of EVERTAUT Canteen Tables and Stacking Chairs to:

EVERTAUT LTD., WALSALL ROAD, PERRY BARR, BIRMINGHAM 22.

(Proprietors: T. B. Brooks & Co., Ltd.)

CANNING TOWN GLASS WORKS LTD.

NEW BRIDGE ST. HOUSE, 30-34 NEW BRIDGE ST., E.C.4
Telephone: CENTRAL 5342-5 *Telegrams: DRYAD, LUD, LONDON*
FACTORIES: CANNING TOWN, E.16 AND QUEENBOROUGH, KENT

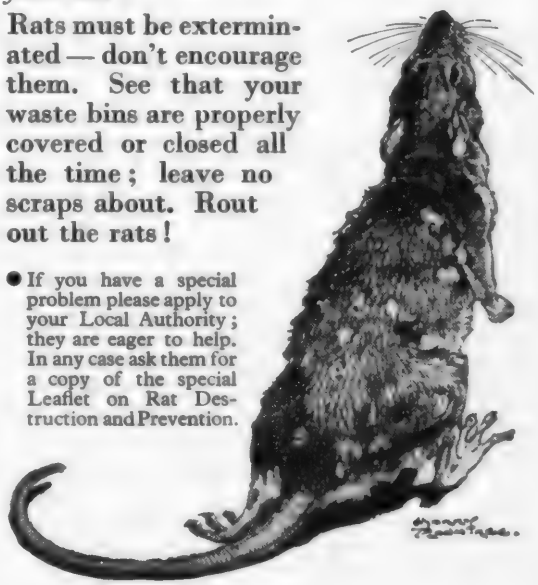
AUTOMATIC
FILLING
The most complete range of Automatic Weighing Screw Filling and Volume Filling Machinery for Teas, Cereals, Flour, Face Powders, Medicinal Powders, or any powdered or granulated material packed in Bags, Cartons, Tins, Bottles, etc
Completely Automatic Plant for Bag or Envelope Filling & Sealing
Full Range Automatic Ampoule Laboratory Equipment, Filling & Sealing Liquids or Powders
The Automatic Weighing & Packing Machine Co.
(Proprietor: Arthur R. Smith)
22 Caroline Street
Birmingham 3

THEY FOUL YOUR PRODUCTS AND STEAL YOUR PROFITS

Rats eat, despoil and gnaw their way through millions of pounds worth of produce every year — the Nation's loss and *your loss!*

Rats must be exterminated — don't encourage them. See that your waste bins are properly covered or closed all the time; leave no scraps about. Rout out the rats!

● If you have a special problem please apply to your Local Authority; they are eager to help. In any case ask them for a copy of the special Leaflet on Rat Destruction and Prevention.



Rout out the Rats!

FREE LEAFLETS—full of concise, helpful hints on the trapping, killing and gassing of rats—are available FROM LOCAL AUTHORITIES

T.2

KILL RATS— and SAVE FOOD

Rats are causing millions of pounds' worth of food to be wasted. Sanitary Officials are constantly fighting these pests, but that is not enough. To-day the Government calls upon everyone to help destroy rats and mice.

use **RODINE**

Sold by all Chemists or direct **T. Harley Ltd., Perth, Scotland**

TECHNICAL BOOKS

Scientific and Technical Books supplied from stock.
Foreign Books not in stock obtained under Licence.
Lists of books on Chemistry and Chemical Technology, post free on application.

SCIENTIFIC AND TECHNICAL
LENDING LIBRARY

Annual Subscription from One Guinea.
Detailed prospectus free on request.

H. K. LEWIS & Co. Ltd.
136 Gower Street, London, W.C.1

We are doing all we can to help our
OLD CUSTOMERS
and hope the time will soon come when we can seek new ones.

EDME LTD. MALT EXTRACT MANUFACTURERS.

Market Square, FARINGDON, BERKS.
Phone: Faringdon 2187 *Grams: Edme, Faringdon, Berks.*
Works: MISTLEY, ESSEX.

ESTABLISHED 1807
FULLER, HORSEY
SONS and CASSELL

Specialists in the
SALE AND VALUATION
OF
FOOD MANUFACTURING PLANTS
OF EVERY DESCRIPTION

10, BILLITER SQUARE, LONDON, E.C.3
Telephone: Royal 4861
AND AT
38, GEORGE V AVENUE PINNER, MIDDX.
Telephone: Pinner 6260

USED
TEA CHESTS, CARTONS
WOOD BOXES, 1 2 & 3oz Bottles

CAN BE SUPPLIED BY
The BUCKINGHAMSHIRE PAPER & BOX Co. Ltd.
DEVONSHIRE WORKS, CHISWICK, LONDON, W.4
'Phone: Chiswick 2954/5/0

DRIED
VEGETABLES, HERBS, & VEGETABLE POWDERS
Produced in the United Kingdom
by
The Farmers Marketing and Supply Co. Ltd., London, Wisbech, etc.

Sole Selling Agents for these products in the food industry:
GEO. W. RHODES & SON, LTD.
71a, QUEEN VICTORIA ST., LONDON, E.C.4
Telephone: Central 3711

NATURAL AND TERPENELESS ESSENTIAL OILS.
FRUIT JUICES. VAN-B-NESS.
LEM-O-NESS.
T. HARRISON & CO.
BURNLEY HOUSE, LONDON, N.W.10
ESTABLISHED 1920

TUFNOL
Regd. Trade Mark.

ELLISON INSULATIONS LTD.,
PERRY BARR, BIRMINGHAM 22

MEAT . . . SAUSAGES . . . .

Revised second edition. Ready June 1st, 1942.

"SAUSAGES AND SMALL GOODS PRODUCTION" is a handy guide to the preparation of sausages and other meat products. Gives many recipes.

I. Introduction.
II. Equipment.
III. Costing.
IV. Storage and Preservation.
V. Binders.
VI. Seasonings.
VII. Casings.
VIII. Curing.
IX. Sausage Recipes.
X. Cooked Sausage.
XI. Cooked Meats.
XII. Utilising Waste.

Reserve your copy now

FOOD MANUFACTURE 17 Stratford Place, London, W.1

OPPORTUNITIES

SECOND-HAND PLANT • SITUATIONS • AGENCIES • WANTS

Small advertisements in FOOD MANUFACTURE must be PREPAID. **Advertisements cannot be inserted unless this condition is fulfilled.**
3d. a word (Situations Wanted, 2d. a word), minimum 4s. Box numbers 1s. extra. THREE INSERTIONS FOR THE PRICE OF TWO.

SITUATIONS VACANT

CHEMIST required by large firm of food manufacturers; applicants must have exceptional qualifications and experience in dealing with a wide range of food products. Reply, giving full details of previous experience, salary required and how engaged at present, to Box B393, *Food Manufacture*, 17, Stratford Place, London, W.1.

A VACANCY now presents itself in an old-established Bakers' and Confectioners' Sundries Manufacturing Firm, for a Manager to take charge of the Confectionery Department. Applicants must have first-class knowledge of fondant manufacture, almond products, jams, piping jellies, etc., etc. This is an excellent opportunity for the successful applicant.—Box B380, *Food Manufacture*, 17, Stratford Place, London, W.1.

CONSULTING CHEMIST. All classes food products. Able to provide or adjust formulæ suitable to wartime conditions. Useful business contacts, able organiser, could undertake part-time work on firm's own premises (London district) or in own laboratory.—Box B374, *Food Manufacture*, 17, Stratford Place, London, W.1.

PRACTICAL Expert on all Bakers Sundries and Allied Goods. High-class qualities, also substitutes. Attractive salary for capable man.—Apply Box B372, *Food Manufacture*, 17, Stratford Place, London, W.1.

SITUATIONS WANTED

WORKING foreman, aged 32 (exempt military service), practical experience in manufacture of custard, blanc-mange, baking and egg substitute powders, jelly crystals, lemonade powder, etc., desires situation, preferably in London area.—Box B304, *Food Manufacture*, 17, Stratford Place, London, W.1.

YOUNG Chemist, whose present position as factory manager ceases shortly as result of concentration of production, seeks responsible post requiring energy and initiative. Advertiser has wide experience in the food industry, and can show excellent references.—Box B405, *Food Manufacture*, 17, Stratford Place, London, W.1.

CHEMIST, 30, exempt, industrial and bacteriological experience, used to plant control and laboratory work, wants suitable position. Manchester pref.—Box B370, *Food Manufacture*, 17, Stratford Place, London, W.1.

BUSINESS OPPORTUNITIES

Well-established Concern wish to contact Food Manufacturers in South or South Midlands or near London with a view to arranging manufacturing facilities and distribution. Present activities: Canning fruit and vegetables; Bakers' Sundries and a fair merchanting business in allied lines. Efficient sales staff. The object of the proposed arrangement is to economise on transport and shipping and insure against eventualities.—Box B429, *Food Manufacture*, 17 Stratford Place, London, W.1.

IMPORTANT!

JAM MANUFACTURERS, Fruit Pulp Preservers, and Merchants who store Fruit Pulps in the open, will be interested to learn of a simple and inexpensive method by which the temperature of casks can be greatly reduced even during the hottest summer weather.— Box B409, *Food Manufacture*, 17 Stratford Place, London, W.1.

CAPITAL.—Advertiser has Clients with £2,000 to £10,000 each wanting Directorships of new or established Companies.—Write, Box B413, *Food Manufacture*, 17, Stratford Place, London, W.1.

PLANT FOR SALE

FIVE Vertical Open Top Steam-Jacketed Pans, 6 ft. 3 ins. dia. by 3 ft. 6 ins. deep; inner pan of cast iron with M.S. jacket; arranged with steam connections and bottom run-off; working pressure 60 lbs. per sq. inch.

Five Vertical M.S. Steam-Jacketed Pans, 6 ft. dia. by 2 ft. deep inside; fitted with vacuum tight bolted-on cover; arranged with steam connections and bottom run-off; working pressure 60 lbs. per sq. inch.

Two Vacuum Drying Ovens, approx. 10 ft by 8 ft. by 8 ft., with steam coils and swinging trays; bolted hinged doors.

Two Drying Chambers or Autoclaves, each 60 ft. long by 6 ft. 6 ins. dia.; last working at 120 lbs. steam pressure; each fitted with davit hung removable dished end secured by hinged bolts. As NEW.

GEORGE COHEN
SONS & CO. LTD.
STANNINGLEY, Nr. LEEDS and WOOD LANE, LONDON, W.12

BUSINESS OPPORTUNITIES

E. & A. RESEARCH CORPORATION have facilities for conducting research and investigations on all kinds of problems.
The well-equipped Laboratories can undertake Chemical analyses, Vitamin estimations, problems in manufacturing processes, production of substitutes, etc. Whatever your difficulty, write—
E. & A. RESEARCH CORPORATION
227/229, Hammersmith Rd., London, W.6

LARGE provision firm, with wide-established circle of regular customers all over the country, is interested in additional lines suitable for grocery and provision trade. Would accept agencies for distribution or buy concerns producing such commodities.—Reply Box 982, 8, Serle Street, London, W.C.2.

NORTH LONDON. Well-lighted factory and warehouse on ground and three upper floors. Total area 37,500 sq. ft. (about 10,000 sq. ft. on ground floor). Two Lifts. Air-raid shelter 250 persons. Covered loading dock and yard. Freehold price £20,000, or to let on lease at £1,750 p.a. ex.—For details apply to Chamberlain and Willows, 345, Goswell Road, E.C.1. Telephone: Terminus 2241.

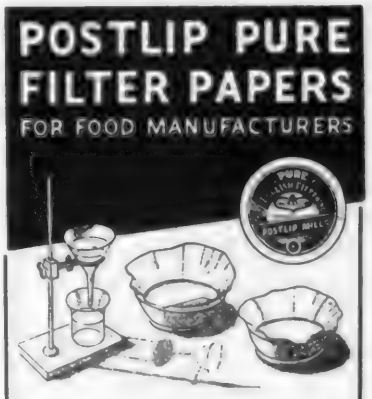
TABLET Manufacturers are in a position to accept Contracts or Sub-contracts for tableting (including Saccharin) in large or small quantities; also tableting from your own formulæ. Packing facilities also available and prompt delivery assured.—Enquiries Box B411, *Food Manufacture*, 17, Stratford Place, London, W.1.

CONSULTANTS

WOULD you like manufacturing difficulties examined: manufacturing economies initiated: new products evolved? If so, write to "Specialist"—*preliminary examination free.*—Box B129, *Food Manufacture*, 17, Stratford Place, London, W.1.

FACTORIES WANTED

Advertiser seeks Factory Premises approximately 10,000 square feet. Situated Central or West London; suitable for Food Manufacture, preferably with steam or facilities for same.—Phone: Chiswick 3961



Crinkled White and Grey in large sizes for Filter Presses, White and Grey in various qualities, in circles and squares for Laboratory Work.

Trial Sample on application to the Makers

EVANS ADLARD
& CO., LTD.
Postlip Mills, Winchcombe
CHELTENHAM, Eng.

POINTING'S
for
.... BRILLIANT HIGHLY CONCENTRATED HARMLESS AND SOLUBLE ....
Pure **FOOD COLOURS**
T. J. POINTING & SON · HEXHAM-ON-TYNE

STURGE

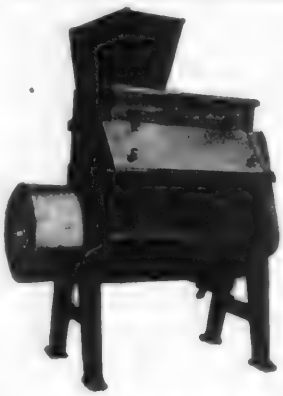
CITRIC ACID

A Biological Product

Absolutely pure. Guaranteed uniform and up to the highest food and drink standards.

JOHN & E. STURGE LTD.,

1 WHEELEYS ROAD, BIRMINGHAM 15



GRINDERS, CRUSHERS, SIFTERS, MIXERS DRIERS, ETC.

WE HAVE SPECIALISED ON THIS CLASS OF MACHINERY FOR 35 YEARS

W. S. BARRON & SON, LTD.

(DEPT. A)

GLOUCESTER

Telephone: 2255 Gloucester

Telegrams: Barron, Gloucester

DRIED VEGETABLES AND DRIED HERBS

AGRICULTURAL & CHEMICAL PRODUCTS LTD.

32 Bishopsgate, London, E.C.3

Telephone : London Wall 2934

SECOND-HAND PLANT FOR SALE

REBUILT WEIGHING MACHINES. Platform scales, Crane Weighers, Counting scales, Automatic Visible Weighers, Scales and Weights. Government Stamped by Weights & Measures Inspectors. Several ready for immediate delivery. Please write stating your requirements.—Herbert Mander, Ltd., 1 Cropley Street, City Road, London, N. 1. Telephone : Clerkenwell 4093.

SECOND-HAND PLANT FOR SALE

PUFFED CEREALS

Complete Puffed Cereal Equipment for sale. Intact and in good condition. Low price.—For further details apply to Box B427, *Food Manufacture*, 17, Stratford Place, London, W.1.

AUTOMATIC weighing and filling machine required — either new or second-hand, capable of filling 1 lb. linen bags or cartons—by Soya Foods Ltd., "Boreham Holt," Elstree, Herts. Telephone: Elstree 2421.

Telephone: 98 Staines.

CHOCOLATE Kettle; 4 Pot Conche; 80 quart 3-Speed Mixer; C.I. Jacketed Pan, 40 gallons; Small Twin Roll Milk Drier; Homogeniser; Milk Pump; 1 cwt. Fondant Mixer; Small Filter Press.—Harry H. Gardam and Co., Ltd., Staines.

HOBART or similar electric mixer, size about 10 or 20 quart in new-like condition, complete with electric motor (state voltage). Also power mincer complete with electric motor (direct drive).—Supreme Manufacturing Co., Ltd., 44, Weaman Street, Birmingham, 2.

JAM Boiler required, previous experience essential, for work in factory in East London. — Reply Box B418, *Food Manufacture*, 17, Stratford Place, London, W.1.

MANUFACTURERS urgently require Beth Labelling Machines and automatic weighing and packing machines, second-hand, for ¼ lb. and 1 lb. powdered mixtures.—Box B417, *Food Manufacture*, 17, Stratford Place, London, W.1.

WANTED—Malt Roaster or large Coffee Roaster.—Write, giving full particulars with price and where seen, to Box B414, *Food Manufacture*, 17, Stratford Place, London, W.1.

WANTED— Autoclave, 100 gallon capacity, with agitating gear.—Give fullest details, Box B410, *Food Manufacture*, 17, Stratford Place, London, W.1.

WERNER-type Mixer, 3 ft. 4 ins. by 2 ft. 8 ins. by 2 ft. 4 ins., with hand-tilting gear; two Orange Peel Cutting Machines; Johnson Filter Press, 14 plates, 25 ins. square; Ditto, 22 plates, 24 ins. square; small Extruding Machine; Carter 2-sheet Centrifugal Dressing Machine, etc.—Richard Sizer Limited, 21, Dale Street, Liverpool, 2. Telephone: Advance 3982.

PUMPS, all types, both engine and electrically driven, 1 to 22 ins. Hand-operated from ½ to 4 ins. Steam Fire Pumps, complete with accessories. Delivery ex stock. Also other equipment, including patent Tubular Steel Barrows.—Send for List F198, Farrow and Sons, Ltd., Spalding.

FOR SALE, Hurrell's Homogeniser, 100 g.p.h. capacity. V-Belt driven by 3 h.p. motor, 400 v., 3 ph., 50 c.—Apply Box B397, *Food Manufacture*, 17, Stratford Place, London, W.1.

FOR SALE, Eight Welded Steel Enclosed Glass-Lined Tanks. Approx. 125 gallons capacity.—Hubert Jones Ltd., Cobden Street, Pendleton, Salford, 6. Telephone: Pendleton 1373-4.

FOR SALE, Kestner Evaporator, Film type. Good Condition. Complete Calandria Separator, Condenser, Extraction, Vacuum Pumps. Engine to drive same. Capacity 400 galls. liquid per hour.—Box B378, *Food Manufacture*, 17, Stratford Place, London, W.1.

"HASLAM" Ammonia Cooling Plant; "Worssam" Tablet Compressors: Steam-Jacketed Autoclave; Mixers; Jelly Press; Revolving Pans; Chocolate Kettles; "Baker" Five Steel Roller Refiner; 4 ft. 6 in. Granite Bed Melangeur; Steam-Jacketed Pans; Enrobers; Conche; Mincing Machine-Wrappers; Gas Stoves; Copper Pans; Chocolate Skips; etc.—J. Karet & Co. Ltd., 62-64, Great Eastern Road, Stratford, E.15. Telephone: Maryland 1940.

SECOND-HAND PLANT FOR SALE

MACHINERY FOR SALE

1 Clemens Vogls, Vacuum, Half Automatic, Type H.A.R. Double Seaming Machine. Belt driven. Fast and Loose Pulley for seaming round cans up to 7 ins. high and 6 3/16 ins. diameter. Change parts for 3 lb. Ham Roll; A1; A1½.

1 Clemens Vogls, Vacuum, Half Automatic, Type H.A.R. Double Seaming Machine. Belt driven. Fast and Loose Pulley for seaming round cans up to 7 11/16 ins. high by 4 1/16 ins. diameter. Complete with Change parts for A1; A1½ sizes.

1 Premier Filterpress, English Type E.R.

Semi-Automatic Vacuum Seaming Machine. Belt driven. Fast and Loose Pulley for seaming cans up to 7 11/16 ins. high by 4 1/16 ins. diameter. Change parts for Picnic; A1; A1 Tall and 3 lb. Ham Roll. Can be seen in Glasgow.—Reply by letter in first instance to "Canners," Kemp-sell's Advertising Service, 163 Hope Street, Glasgow.

AIR Compressors, Modern Machines, all sizes. Pressures up to 100 lb. Send your inquiries to Box B389, *Food Manufacture*, 17, Stratford Place, London, W.1.

BELT-DRIVEN: 255 cu. ft. Ingersoll Rand, horizontal, 100 lb.; 200 cu. ft. Ingersoll Rand, horizontal, 100 lb.; 150 cu. ft. Ingersoll Rand, horizontal, 100 lb.; 30 cu. ft. Robey vertical, single, 80 lb. pressure. Steam-driven: 300 cu. ft. Peter Brotherhood, 120 lb. pressure; 90 cu. ft. Ditto, 80 lb. pressure, both vertical; all reconditioned before despatch.—Box B390, *Food Manufacture*, 17, Stratford Place, London, W.1.

RICHARDS No. 3 Automatic Slot Drilling and Keyway Milling Machine, for keyways up to 2½ ins. wide.—Box B384, *Food Manufacture*, 17, Stratford Place, London, W.1.

GRINDING Machines: Surface No. 3 Diamond, Horizontal Spindle, 48 ins. by 16 ins. by 8 ins., B.D.; New Horizontal Spindle, hydraulic feed, motor driven. Plain: Model B. Churchill, 10 ins. by 50 ins. capacity. No. 16 B. and S., 7 ins. by 72 ins. capacity. Internal: No. 70 Heald, clutch in head, swing 15 ins. diameter by 11 ins. deep; No. 23 Brown and Sharpe, main table 78 ins. by 9 ins.—Box B385 *Food Manufacture*, 17, Stratford Place, London, W.1.

LARGE and varied stock, good rolled Steel. Joists, Angles, Channels, Roof Principals, etc., lying in various parts of the country. Low prices. Quick delivery.—Box B386, *Food Manufacture*, 17, Stratford Place, London, W.1.

JACKETED Stainless Steel Rectangular Vessel, 250 galls. capacity, with 4 divisions, each with agitators. Jacketed Tin-lined Mixer, capacity 700 galls. Jacketed 60-gall. Aluminium Still or Autoclave, with bronze agitating gear. Jacketed Copper 50-gall. Tipping Pan, with rise and fall agitating gear. Jacketed Vessel by Manlove, 2 ft. 6 ins. by 4 ft. by 7 ft. long, swing door both ends. Jacketed Filter Press by Johnson, with 30 plates and frames 42 ins. diameter by 2 ins. thick.—Box B388, *Food Manufacture*, 17, Stratford Place, London, W.1.

SECOND-HAND PLANT WANTED

WANTED TO PURCHASE

Granulating Mixer and Coating Pan for tablet manufacture. New or second-hand.—Box 796, Spottiswoodes, Regent House, Kingsway, W.C.2.

WANTED, motorised automatic Pie Machine in good condition, Ericson or Cam-Wheat. —Apply Wm. Tattersall and Sons, Ltd., St. Peter Street, Blackburn.

WASHING Plant (medium size) for jam jars required by Jam Manufacturers.—Write full particulars Box B396, *Food Manufacture*, 17, Stratford Place, London, W.1.

WANTED, Gardner's Sifter-Mixer, 200 lb. capacity or similar.—Box B398, *Food Manufacture*, 17, Stratford Place, London, W.1.

DIESEL OR STEAM-DRIVEN GENERATING SETS

Any output up to 100 W.; preferably standard A.C. or 220 volts D.C., but any voltage would be considered. Urgently wanted for war work.

GEORGE COHEN, SONS & CO. LTD., Wood Lane, London, W. 12 (Shepherds Bush 2070). Stanningley, nr. Leeds (Pudsey 2241). And at Birmingham, Sheffield, Manchester, etc.

The Strongest Vanilla Flavour

VANOLEUM

1 oz. (2/6) makes a pint of essence

For further details apply:

ARTHUR WHITTAKER

Newton Heath, Manchester, 10

UP-TO-DATE Food Producers Use

"YOSA" THE SOYA FLOUR

Sole Manufacturers: CALLOW BROS., LTD., Bute Street, Liverpool 5

For DRYING OVENS and FACTORY HEATING

Catalogue from

The Spiral Tube & Components Co. Ltd. Osmaston Park Road, Derby

Master of Your Trade?

Completion of this form will keep you fully informed in all branches of the manufacture of *Chocolate, Confectionery, Biscuits, Bread, Cake; Jam; Glace, Candied and Preserved Fruits; Fruit Juices and Cordials; Jellies, Honey and Lemon Curd; Cheese and Milk Products, Infant, Breakfast and Invalid Foods; Ice Cream; Canned Foods; Meat, Fish and Vegetable Products; Soups, Pickles, Sauces, Pastes and Extracts, and all edible commodities involving a process of manufacture.*

"I enclose herewith 10s.—
12s. 6d. overseas, per annum.
Please send "FOOD MANUFACTURE" regularly.

Name .....

Firm .....

Address .....

Date .....

Return to "Food Manufacture," 17 Stratford Place, London, W.1.

MISCELLANEOUS SALES

BARRELS, about 30 ins. by 24 ins., by 20 ins., with 4 steel Hoops. Close Joints. Clean inside, suitable for foods or any solids. Used once: quantities.—Box B415, *Food Manufacture*, 17, Stratford Place, London, W.1.

SMALL size hand or electric mixer for small experimental batches of cakes, Morton or other make.—Box B412, *Food Manufacture*, 17, Stratford Place, London, W.1.

INVITE offers of surplus and redundant plant such as oil and flour mill machinery, paint works plant, jacketed pans and mixers, vacuum vessels with pumps, filter presses, drying machines, conveyors, elevators, etc. Personal attention will be given to offers received and business arranged wherever possible.—Richard Sizer Ltd., Cuber Works, Hull.

AIR Compressors, modern machines, all sizes, pressures up to 100 lbs.—Send your enquiries to Box B408, *Food Manufacture*, 17, Stratford Place, London, W.1.

BOTTLES. 50,000 Amber 3-oz. Emulsion Type, complete with cream-coloured screw caps, fitted liners. Immediate delivery.—Lautier Fils Limited, Power Road, Chiswick, W.4.

MISCELLANEOUS WANTS

Acetic, Phosphoric, Lactic, Tartaric and Citric Acids. Firm quotation, stating quantities available to Box B419, *Food Manufacture*, 17, Stratford Place, London, W.1.

MILLER'S Vertical Measuring Table, 24 ins. by 8 ins.—State make, size and price. Box B407, *Food Manufacture*, 17, Stratford Place, London, W.1.

MILLING concern in Liverpool with surplus cereal grinding capacity of 100-150 tons weekly invite enquiries. Only regular work entertained.—Reply Box B406, *Food Manufacture*, 17, Stratford Place, London, W.1.

WANTED, three Standard Horizontal Retorts. Size approximately 3 ft. by 3 ft. by 9 ft. long.—Box 564, Dorlands, 18-20, Regent Street, W.1.

MAY WE DISPOSE OF YOUR OLD BLOCKS AND HELP THE RED CROSS FUND

?

CHEVLER

GREASEPROOF CARTONS

(Guaranteed Non-Leak)

Re-inforced Base fitted to all cartons and tins can be poured in liquid form.

Very suitable for the service of EDIBLE FATS, ESSENTIAL FOODSTUFFS also WAXES, POLISHES, Etc. (The latter for Export)

CHEVERTON & LAIDLER

Makers of Paper Containers,

CHEVLER WORKS

PRINCES RISBOROUGH

Phone 61. AYLESBURY, Bucks.

* We offer a specialised industrial book service to our readers. A request will bring a comprehensive list of text books on any industrial subject. — *Food Manufacture*, 17, Stratford Place, London, W.1.

SEALEX

TRADE MARK

Flowed-in

LINING & CAP COMPOUNDS

The Certificate of the Royal Institute of Public Health and Hygiene has been awarded in respect of our range of SEALEX Compounds.

For samples and quotations apply to:

RUBBER LATEX LTD.

ST. DUNSTAN'S HOUSE

IDOL LANE · LONDON · E.C.3

Telephone: MANsion House 1005

The PERFECT air-tight closure for all containers

'TRANSOTAPE'

CELLULOSE SELF-ADHESIVE TAPE

Samples & Prices from

JOHN GOSHERON & CO. LTD. Gayford Rd. LONDON W.12

It's AIRPROOF WATERPROOF and GERMPROOF

ALL BRITISH ROTARY OR RECIPROCATING
GERYK HIGH VACUUM

PUMPS

FOR FACTORY OR LABORATORY

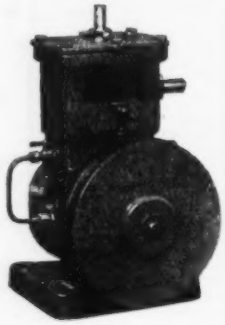
"Pulsometer" Geryk High Vacuum Pumps are of simple construction with fast pumping speeds and absolute certainty of action, and practically endless life.

CAPACITIES :
2 to 250 cubic feet per minute.

VACUA OBTAINABLE
off perfect
Single stage ·005 m.m.
Duplex up to ·00001 m.m.

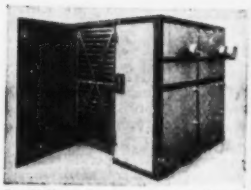
Various types for different conditions.

List No. 2717



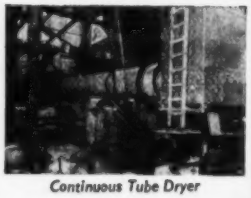
Trade Pulsometer Mark
Geryk 4. S.T.I.
Rotary Vacuum Pump

Pulsometer Engineering Co. Ltd
READING, ENGLAND Established 1875

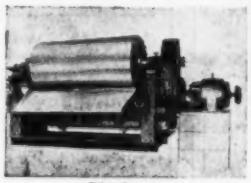


Small Compartment Drying Stove

Hot Air Drying Stove



Continuous Tube Dryer



Film Dryer

Mitchell

Drying Plants and Apparatus of every kind for

FINE CHEMICALS
MAGNESIUM CARBONATE
ZINC STEARATE
POTASSIUM CITRATE
PRECIPITATED CHALK
CHEMICALS
OXIDES
CRYSTALS
DI-CALCIUM PHOSPHATE
STARCH
FOODSTUFFS
COLOURS, etc., etc.

Drying Plants for moisture removal from Air and Gases

L.A. MITCHELL LIMITED
37, PETER STREET MANCHESTER

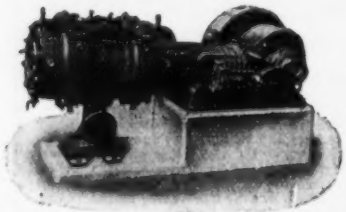
Associated with:
Pratchitt Bros. Ltd., Carlisle

VEGETABLE POWDERS
DRIED HERBS
(packets and bulk)
Vermouth Herbs (French & Italian)
for export

R. BROOKS & CO.
27 MAIDEN LANE, COVENT GARDEN, W.C.2
Telephones: TEMple Bar 2891 & 9464

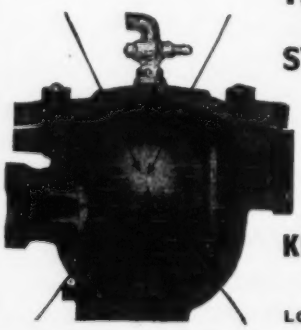
DRY VACUUM PUMPS
FOR ALL DUTIES

Ask for a copy of our Descriptive Pamphlet No. 256



REAVELL & CO. LTD., IPSWICH

Now's the time to instal a
SUPER-ECONOMIC BOILER
and save on your fuel costs
WRITE FOR PARTICULARS
DANKS of NETHERTON, LTD.
NETHERTON · DUDLEY · WORCS.
BOILER MAKERS FOR A CENTURY



"SIMPLICITY"
STEAM TRAPS

DESCRIPTIVE LEAFLET ST 5

THE KEY ENGINEERING CO. LTD.
LONDON · MANCHESTER

DAREX LINING COMPOUNDS

★ ★ ★

GOLD SEAL CAP COMPOUNDS

For Sealing Glass Jars

★ ★ ★

DEWALCO SEAM DOPES

For Black-Iron Cans—
Ends and Side Seams

★ ★ ★

DEWALCO SOLDERING FLUXES

Liquid and Crystal

★ ★ ★

DEWALCO DRAWING LUBRICANTS

For Stamping Tin Plate and Black Iron

★ ★ ★

GOLD SEAL TIN-PASTE

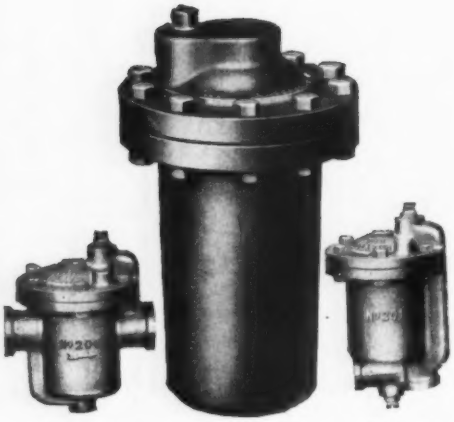
For Spot Labelling
to Metal or Glass

★ ★ ★

DEWEY & ALMY LTD.

Factory and Offices :

Elveden Road, Park Royal, London, N.W.10



No. 200 No. 211-216 No. 201

Steam Trap Jottings

No. 2

The use of an inverted bucket or bell has proved to be so successful that many trap manufacturers have standardised on this type. All inverted bucket type traps depend for their operation on being charged with water, so that the bucket rises immediately steam enters.

In many applications the entry of steam is preceded by sufficient condense to prime the trap. In others, where this is not the case, the trap must be charged with water. Broadly speaking, traps will prime themselves on heaters, but care is necessary with traps used for steam main drainage.

If you are interested in traps and trapping, send for a copy of the Drayton/Armstrong trap book. Free.

Drayton – Armstrong
The TROUBLE-FREE – STEAM TRAP

THE DRAYTON REGULATOR & INSTRUMENT
WEST DRAYTON CO. LTD. MIDDLESEX

Printed for the Proprietors, LEONARD HILL LIMITED, and published by them at their Offices, 17 Stratford Place, London, W. 1, by Billing and Sons Ltd., The London Printing Works, Guildford and Esher, England.